INSTALLATION RESTORATION PROGRAM

(1)

PRELIMINARY ASSESSMENT

179th Tactical Airlift Group
Ohio Air National Guard

Mansfield Lahm Airport

Mansfield, Ohio

November 1989

AIR NATIONAL GUARD

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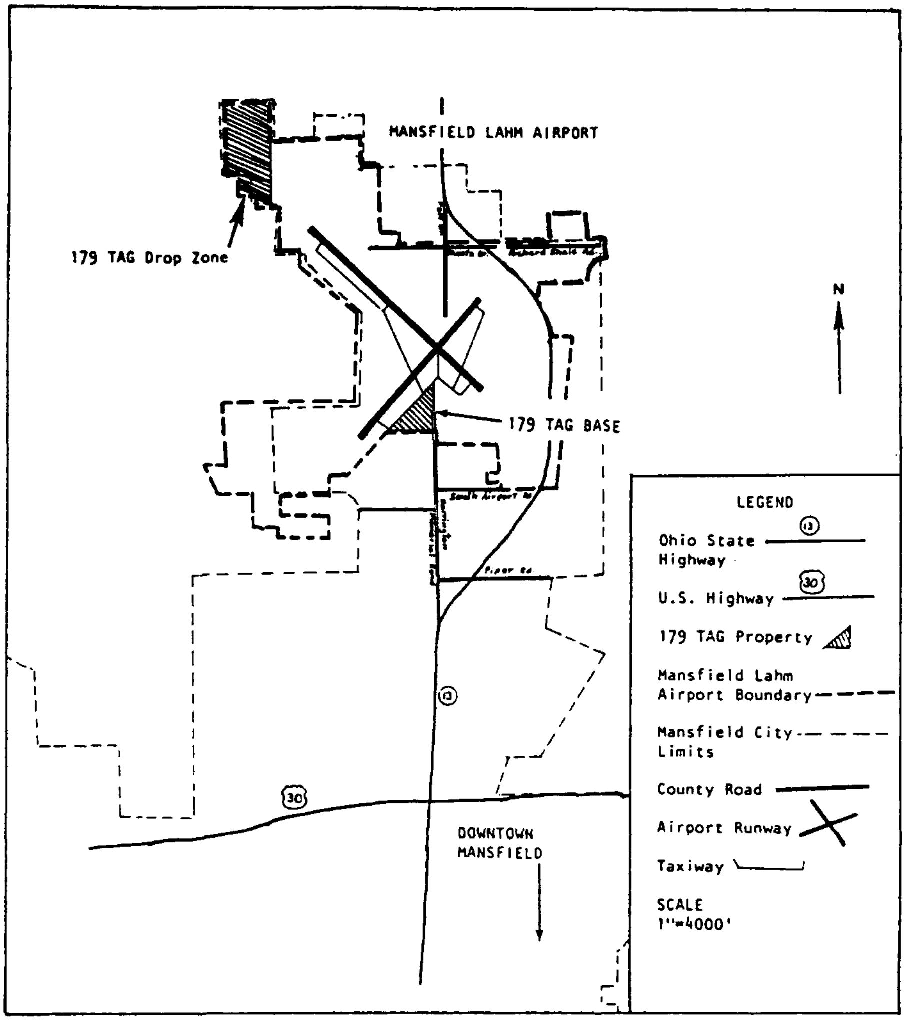

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Preliminary Assessment of hazardous waste sites at the Ohio Air National Guard Base located at the Mansfield Lahm Airport. The study was conducted under the Air National Guard's Installation Restoration Program.

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OHIO AIR NATIONAL GUARD
MANSFIELD LAHM AIRPORT
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ACRONYM LIST

AFFF	Aqueous Film-Forming Foaming
AFOEHL	Air Force Occupational and Environmental Health Laboratory
AGE	Aerospace Ground Equipment
AMSL	Above Mean Sea Level
ANG	Air National Guard
ANGSC	Air National Guard Support Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, also called "Superfund"
DD	Decision Document
DoD	Department of Defense
DoE	Department of Energy
DPDO	Defense Property Disposal Offices
DRMO	Defense Reutilization and Marketing Office
EPA	Environmental Protection Agency
FTA	Fire Training Area
GPM	Gallons Per Minute
HARM	Hazard Assessment Rating Methodology
HAS	Hazard Assessment Score
HRS	Hazard Ranking System
IRP	Installation Restoration Program
NGB	National Guard Bureau
NPDES	National Pollutant Discharge Elimination System
O/W	Oil/Water
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl
POL	Petroleum, Oil and Lubricant
RCRA	Resource Conservation and Recovery Act of 1976
SARA	Superfund Amendments and Reauthorization Act of 1986
SCS	Soil Conservation Service
TAG	Tactical Airlift Group
TAS	Tactical Airlift Squadron
TFG	Tactical Fighter Group
TFS	Tactical Fighter Squadron
USAF	United States Air Force
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UST	Underground Storage Tank

D. RECOMMENDATIONS

Initiation of further IRP investigations is recommended for these eight potential sites.

I. INTRODUCTION

A. BACKGROUND

The 179 TAG is located at Mansfield Lahm Airport, Mansfield, Ohio. [Hereinafter referred to as the Base]. The Air National Guard has been active at Mansfield Lahm Airport since 1948, and over the years a variety of military aircraft have been located and serviced there. Both the past and current operations involve the use of hazardous materials and disposal of hazardous wastes. The potential disposal sites for these hazardous materials should be evaluated for possible contamination.

The Department of Defense (DoD) Installation Restoration Program (IRP) is a comprehensive program designed to:

- o Identify and fully evaluate suspected problems associated with past hazardous waste disposal and/or spill sites on DoD installations, and
- o Control hazards to human health, welfare, and the environment that may have resulted from these past practices.

During June 1980, DoD issued a Defense Environmental Quality Program Policy Memorandum (DEQPPM 80-6) requiring identification of past hazardous waste disposal sites on DoD installations. The policy was issued in response to the Resource Conservation and Recovery Act of 1976 (RCRA) and in anticipation of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA, Public Law 96-510) commonly known as "Superfund." In August 1981, the President delegated certain authority specified under CERCLA to the Secretary of Defense via Executive Order (EO 12316). As a result of EO 12316, DoD revised the IRP by issuing DEQPPM 81-5 on December 11, 1981, which reissued and amplified all previous directives and memoranda.

Although the DoD IRP and the EPA Superfund programs were essentially the same, differences in the definition of program phases and lines of authority resulted in some confusion between DoD and state/federal regulatory agencies. These difficulties were rectified via passage of the Superfund Amendments and Reauthorization Act (SARA, PL-99-499) of 1986. On January 23, 1987, Presidential Executive Order EO 12580 was issued. EO 12580 effectively revoked EO 12316 and implemented the changes promulgated by SARA.

The most important changes affected by SARA included the following:

- Section 120 of SARA provides that federal facilities, including those in DoD, are subject to all the provisions of CERCLA/SARA concerning site assessment, evaluation under the National Contingency Plan (NCP) [40CFR300], listing on the National Priorities List (NPL), and removal/remedial actions. DoD must therefore comply with all the procedural and substantive requirements (guidelines, rules, regulations, and criteria) promulgated by the Environmental Protection Agency (EPA) under Superfund authority.

- Section 211 of SARA also provides continuing statutory authority for DoD to conduct its IRP as part of the Defense Environmental Restoration Program (DERP). This was accomplished by adding Chapter 160, Sections 2701-2707 to Title 10 United States Code (10 USC 160).

- SARA also stipulated that terminology used to describe or otherwise identify actions carried out under the IRP shall be substantially the same as the terminology of the regulations and guidelines issued by EPA under their Superfund authority.

As a result of SARA, the operational activities of the IRP are currently defined and described as follows:

Preliminary Assessment (PA)

A records search designed to identify and evaluate past disposal and/or spill sites which might pose a potential and/or actual hazard to public health, welfare, or the environment.

Site Inspection/Remedial Investigation/Feasibility Study (SI/RI/FS)

The Site Inspection consists of field activities designed to confirm the presence or absence of contamination at the sites identified as a result of the PA. The RI consists of field activities designed to quantify and identify the potential contamination present, the extent of the contaminant plume, and the pathways of contaminant migration.

If applicable, a public health evaluation is performed to analyze the collected data. Field tests are required that may necessitate the installation of monitoring wells or the collection and analysis of water, soil, and/or sediment samples. Careful documentation and quality control procedures, in accordance with CERCLA/SARA guidelines, ensure the validity of data. Hydrogeologic studies are conducted to determine the underlying strata, groundwater flow rates, and direction of contamination migration. The findings from these studies result in the selection of one or more of the following options:

- **No further action** - Investigations do not indicate harmful levels of contamination and do not pose a significant threat to human health or the environment. The site does not warrant further IRP action and a Decision Document (DD) will be prepared to close out the site.

- **Long-term monitoring** - Evaluations do not detect sufficient contamination to justify costly remedial actions. Long-term monitoring may be recommended to detect the possibility of future problems.

- **Feasibility Study** - Investigations confirm the presence of contamination that may pose a threat to human health and/or the environment, and some form of remedial action is indicated. The FS is therefore designed and developed to identify and select the most appropriate remedial action. The FS may include individual sites, groups of sites, or all sites on an installation. Remedial alternatives are chosen according to engineering and cost feasibility, state/federal regulatory requirements, public health effects, and environmental impacts. The end result of the FS is the selection of the most appropriate remedial action by the Air National Guard (ANG) with concurrence by state and/or federal regulatory agencies.

Remedial Design/Remedial Action (RD/RA) - The RD involves formulation and approval of the engineering designs required to implement the selected remedial action. The RA is the actual implementation of the remedial alternative. It refers to the accomplishment of measures to eliminate the hazard or, at a minimum, reduce it to an acceptable limit.

Covering a landfill with an impermeable cap, pumping and treating contaminated groundwater, installing a new water distribution system, and in situ biodegradation of contaminated soils are examples of remedial measures that might be selected. In some cases, after the remedial actions have been completed, a long-term monitoring system may be installed as a precautionary measure to detect any contaminant migration or to document the efficiency of remediation.

Research and Development (R&D) - R&D activities are not always applicable for an IRP site but may be necessary if there is a requirement for additional research and development of control measures. R&D tasks may be initiated for sites that cannot be characterized or controlled through the application of currently available, proven technology. It can also, in some instances, be used for sites deemed suitable for evaluating new technologies.

Immediate Action Alternatives - At any point, it may be determined that a former waste disposal site poses an immediate threat to public health or the environment, thus necessitating prompt removal of the contaminant. Immediate actions, such as limiting access to the site, capping or removing contaminated soils and/or providing an alternate water supply may suffice as effective control measures. Sites requiring immediate removal action maintain IRP status in order to determine the need for additional remedial planning or long-term monitoring. Removal measures or other appropriate remedial actions may be implemented during any phase of an IRP project.

B. PURPOSE

The purpose of this PA Records Search is to identify and evaluate suspected problems associated with past waste handling procedures, disposal sites, and spill sites on the Base property.

The potential for migration of hazardous contaminants was evaluated by visiting the Base, reviewing existing environmental data, analyzing Base records concerning the use and generation of hazardous materials, and conducting interviews with present and past Base personnel who had knowledge of handling methods. Pertinent information collected and analyzed as part of the Records Search included the history of the Base; the local geological, hydrological, and meteorological conditions that might influence migration of contaminants; and ecological settings that indicate environmentally sensitive conditions.

C. SCOPE

The scope of this PA was limited to the identification of sites at, or under primary control of, the Base and evaluation of potential receptors. The PA included:

- o an on site visit during September 19-23, 1988;
- o acquisition of records and information on hazardous materials use and waste handling practices;
- o acquisition of available geologic, hydrologic, meteorologic, land use and zoning, critical habitat, and related data from federal and Ohio state agencies;
- o a review and analysis of all information obtained; and
- o preparation of a summary report to include recommendations for further action.

The subcontractor effort was conducted by the following Science & Technology, Inc. (SciTek) personnel: Mr. Tracy C. Brown, Research Associate; Mr. Jack D. Wheat, Hydrogeologist; and Mr. Ray S. Clark, Civil/ Environmental Engineer. Resumes of Search Team members are included in Appendix A. Mr. Daniel P. Waltz of the Air National Guard Support Center (ANGSC) is Project Officer for this Base and participated in the overall assessment during the week of the site visit.

The point of contact at the Base was Major Gregory S. Mooney, Base Environmental Coordinator. Major Stephen A. Jameson is Base Civil Engineer.

D. METHODOLOGY

Figure I.1 depicts a flow chart of the records search methodology.

The PA began with a site visit to the Base to identify all operations that may have utilized hazardous materials or generated hazardous wastes. Past materials handling procedures were evaluated by extensive interviews with 30 past and present Base employees familiar with the various operating procedures. These interviews were also conducted to

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Preliminary Assessment Methodology Flow Chart

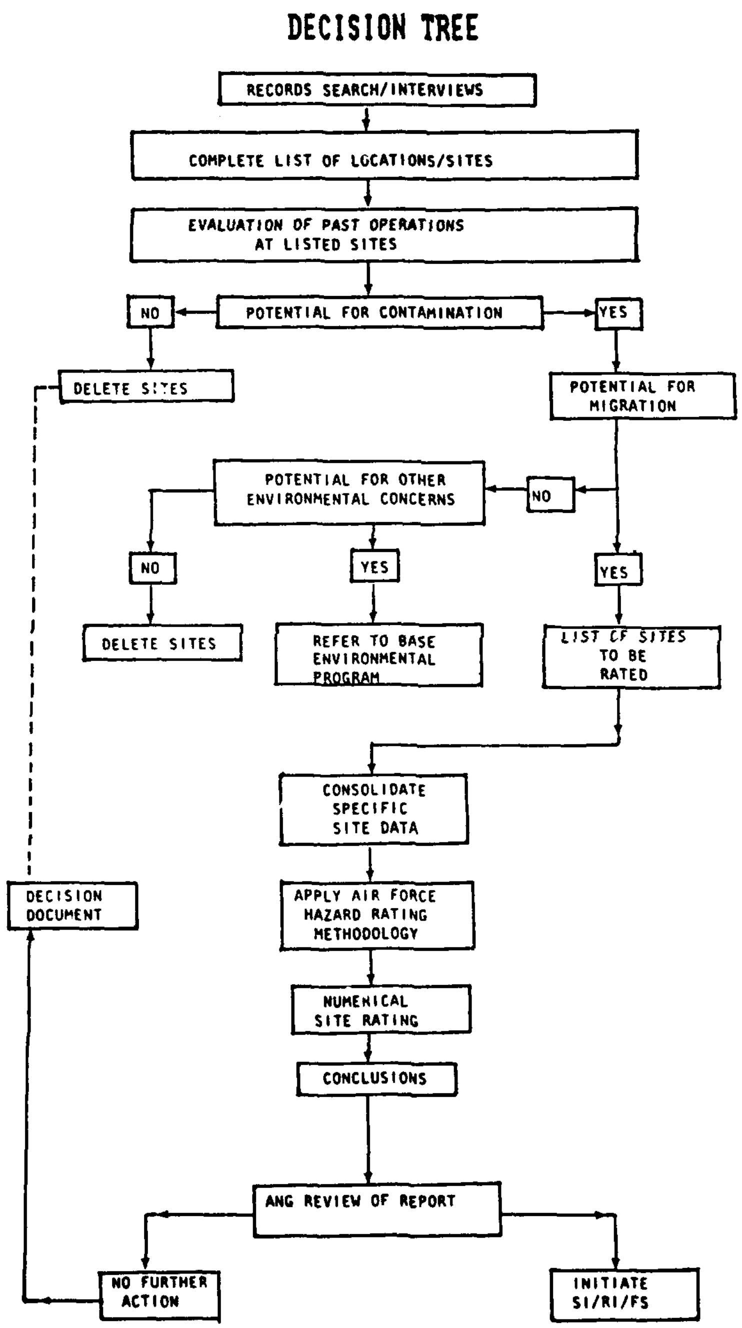

Figure I.1.

determine those areas where waste materials (hazardous or nonhazardous) were used, spilled, stored, disposed of, or released into the environment.

A total of 30 personnel, with experience in all areas of Base operations, were interviewed during the PA site visit. Knowledge and experience with Base operations averaged 22.8 years and ranged from 10 to 36 years. Records contained in the Base files were collected and reviewed to supplement the information obtained from interviews. Eight potential sites were identified to be potentially contaminated and in need of additional investigation. The eight potentially contaminated sites were rated using the Air Force Hazard Assessment Rating Methodology (HARM).

Detailed geological, hydrogeological, meteorological, and environmental data for the area of study was obtained from the appropriate federal and state agencies as identified in Appendix B.

After a detailed analysis of all the information obtained, it was determined that eight sites are potentially contaminated with hazardous materials/ hazardous wastes, and that the potential for contaminant migration exists. Under the IRP program, when sufficient information is available, sites are numerically scored using the HARM. A description of HARM is presented in Appendix C. The eight potentially contaminated sites were scored (Appendix D), and each is recommended for further investigation.

II. INSTALLATION DESCRIPTION

A. LOCATION

The Base is located within Richland County, Ohio in Section 4, Township 21N18W and Section 33, Township 22N18W. Lying four miles north of Mansfield and directly adjacent to the Mansfield Lahm Airport, it straddles the boundary line between the Madison and Franklin Townships. Major routes to the Base include Harrington Memorial Road and Ohio Route 13.

The Base occupies approximately 210 acres of property. Of this, 157 acres are located in the northwest portion of the airport and have been used since 1977 for an airlift drop zone only. No activities associated with the IRP have been or are conducted in this area. The remaining 53 acres are located just west of Harrington Memorial Road and are used as the cantonment area for the Base population of approximately 1000 personnel. In addition to the property, the Base utilizes the taxiways, runways, and other facilities on the airport. Figure II.1 illustrates the location and boundaries of the Base.

B. ORGANIZATION AND HISTORY

Changes in aircraft and mission are responsible for many operational changes. An aircraft conversion is often accompanied by variation in routine maintenance. Changing the engine oil, testing the engine, lubricating the plane, and washing the aircraft are just a few maintenance operations that may differ. Also, some planes of the past used aviation gasoline (AVGAS) while others used JP-4 fuel. In addition, the type and quantity of oils and lubricants used vary with aircraft.

Operational changes also occur because of changes in policies, standards, personnel, technology, etc. For example, years ago it was common practice to spray waste oil on gravel roads for dust control. However, over the years policies have changed and such practices are no longer allowed. Much of the liquid waste is now disposed of through the Defense Reutilization and Marketing Office (DRMO) and private contractors. Oil/Water separators were a technology that greatly reduced the amounts of liquid wastes being released into the environment. Also, the awareness of hazardous materials has further reduced any additional environmental damage and brought about new technologies such as biodegradable compounds.

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Source: 179 TAG Civil Engineering

**Location Map of the 179 TAG,
Mansfield Lahm Airport,
Mansfield, Ohio**

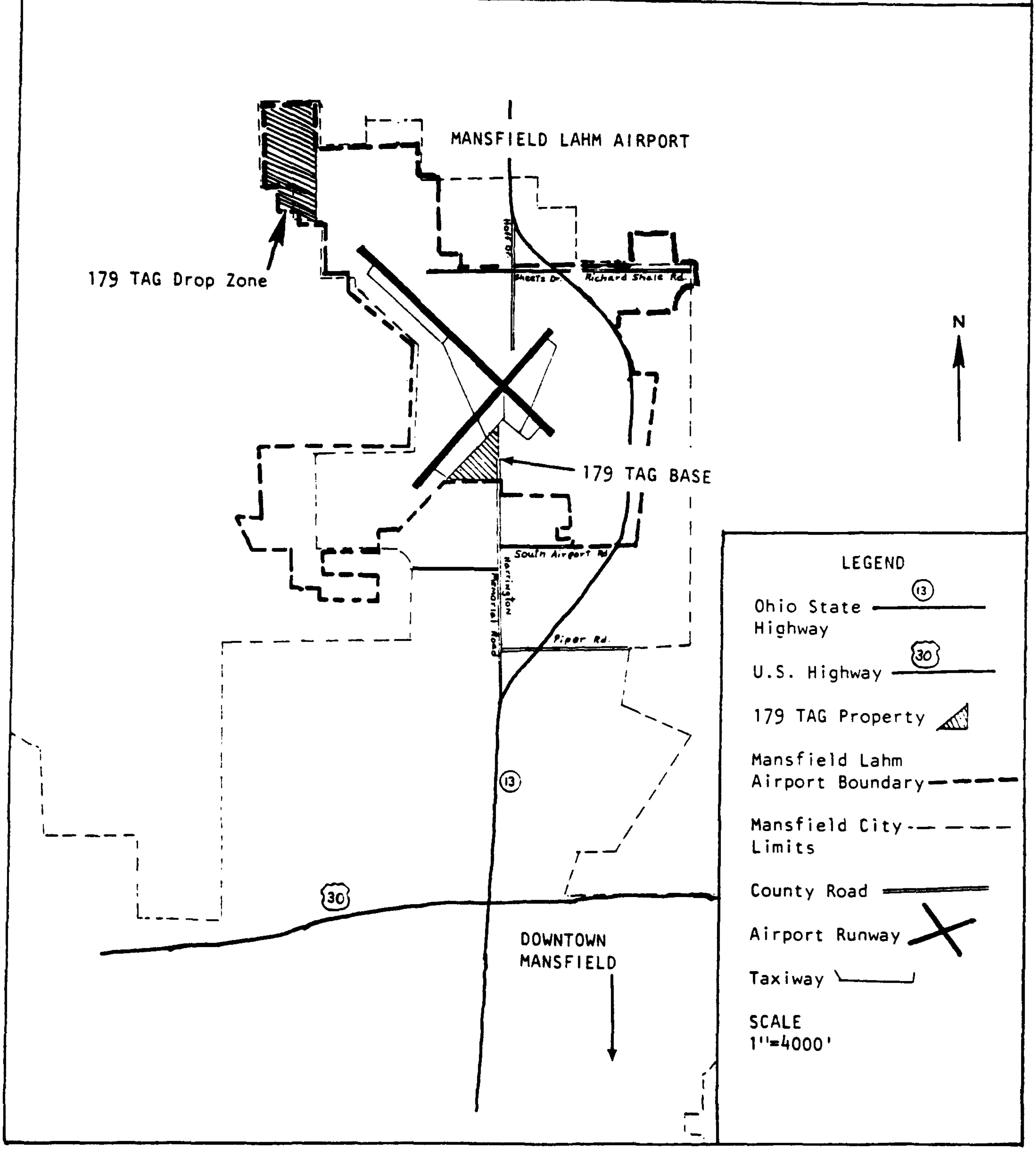


Figure II.1.

The Base has undergone many changes in aircraft, mission, etc., resulting in variation in quantities and types of hazardous materials. Also, disposal methods have changed accordingly. For example, unlike past times, wastes are principally disposed of through DRMO and private contractors.

The 164th Fighter Squadron was formed and federally recognized at Mansfield Airport on June 20, 1948. The unit was originally equipped with the North American P-51D Mustang prior to upgrading to the P-51H in July 1949. Redesignated the 164th Fighter-Bomber Squadron in November 1952, the unit entered the jet age when it received the Lockheed F-80C. In October 1954, the 164th converted again to Republic F-84E Thunderjets, and in July 1955, was redesignated the 164th Fighter-Interceptor Squadron. In September 1957, the Squadron received F-84F Thunderstreaks and in November 1958, the unit was redesignated the 164th Tactical Fighter Squadron (TFS). Its parent unit, the 179th Tactical Fighter Group (TFG) received federal recognition on October 15, 1962. Remaining at Mansfield Lahm Airport, the 179th TFG/164th TFS converted to the F-100D Super Saber, the first "Century Series" fighter, in February 1972. In January 1976, the unit received its current mission, designation as the 179 TAG, and aircraft, the Lockheed C130B "Hercules."

III. ENVIRONMENTAL SETTING

A. METEOROLOGY

The following climatological data were obtained from the weather station located at Mansfield Lahm Airport and from Weather of U. S. Cities. The data obtained is based on records from 1960 through 1984.

The climate of Richland County has a wide range in annual, daily, and day-to-day temperature. The average annual temperature is 49.2°F. Summer is moderately warm and humid with temperatures seldomly exceeding 90°F. Winter is reasonably cold and cloudy and the temperature rarely drops below 0°F. Weather changes occur every few days. The average annual precipitation is 36.23 inches. Having an evaporation rate of nearly 33 inches per year, the net annual precipitation of Richland County is approximately 3.23 inches, using the method outlined in the Federal Register (47 FR 31224, July 16, 1982). The 1-year, 24-hour rainfall is approximately 2.25 inches, according to the Federal Register (47 FR 31235, July 16, 1982). However, the maximum rainfall intensity (1-year, 24-hour rainfall) at the Base is 5.06 inches, using available weather records (1951 - 1980). The precipitation is fairly well distributed throughout the year. Most of the rainfall comes as showers and thunderstorms, and a considerable amount of precipitation in the winter is snow. Severe droughts occur rather infrequently and are usually of short duration.

B. GEOLOGY

The Base is located within the Allegheny Plateau physiographic province. The regional extent of this province is northeastern Ohio, southwestern New York, and western Pennsylvania. The Low Plateau, is a 5 to 15-mile wide section along the northwest margin of the Allegheny Plateau. Richland County, Ohio lies astride the Black Hand escarpment, which forms the boundary between the Allegheny Plateau and the Low Plateau (Figure III.1) (Totten 1973: 2-3).

Surface topography throughout Richland County ranges from gently rolling hills to a maturely dissected plateau. This plateau contains deep valleys that cut into resistent sedimentary rocks. Surface elevations throughout Richland County range from 1000 to 1580 feet Above Mean Sea Level (AMSL). The

SciTek
Source: Totten 1973

Richland County, Ohio Map Illustrating Allegheny Plateau Province, Low Plateau, and Black Hand Escarpment

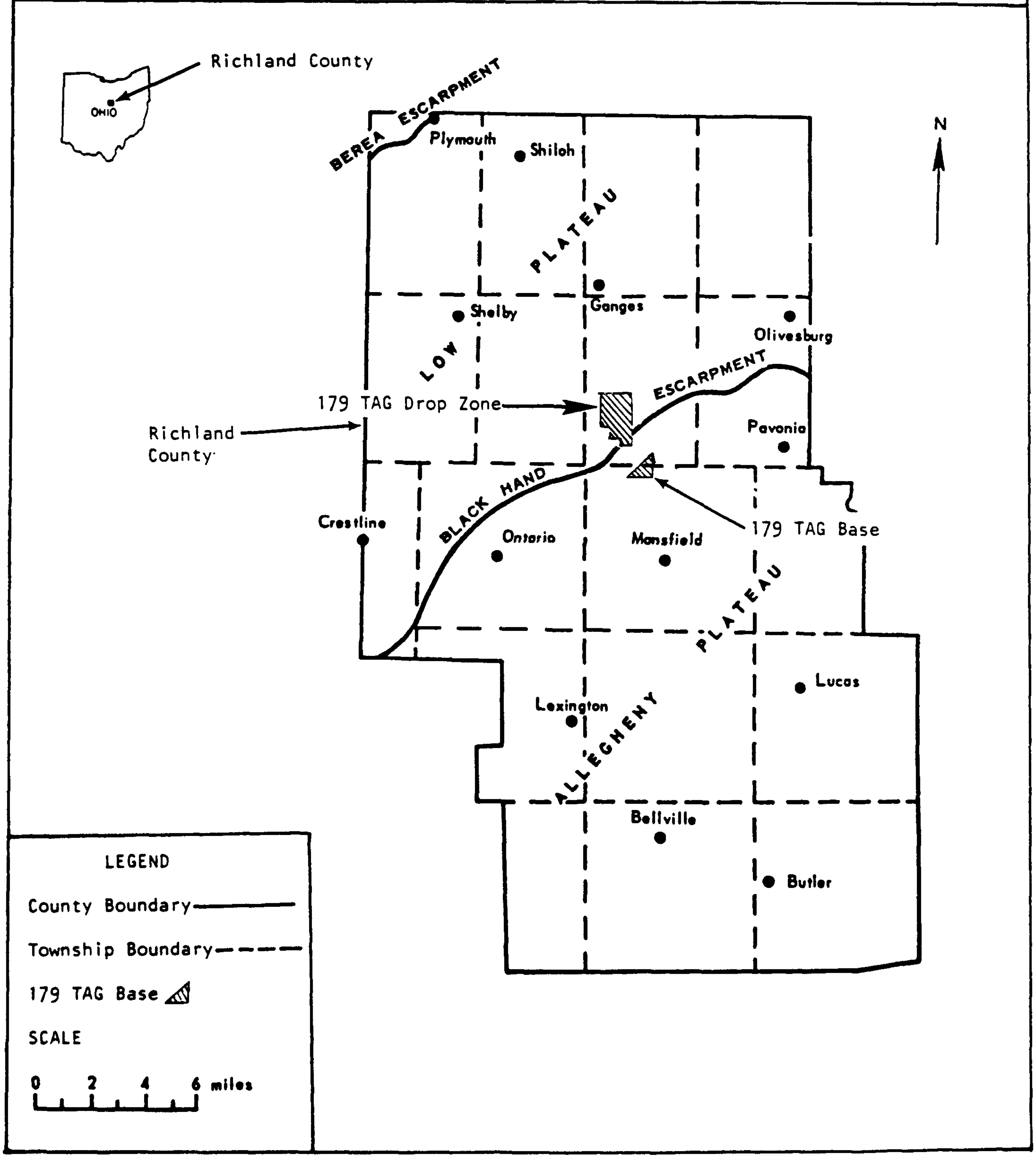


Figure III.1.

local relief in Richland County averages from 40 to 150 feet. The topography throughout Richland County and much of northeastern Ohio has been modified by Pleistocene continental glaciation. The entire landscape was completely overridden by glacial ice during numerous stages of glacial advance. The morphology of stream valleys as well as highlands was changed by glacial erosion and deposition. Pleistocene continental glaciation developed when glacial ice that formed as a result of drastic climatic changes accumulated in southeastern Canada. This ice advanced into the Midwestern United States in a series of glacial lobes. This ice advanced with less resistance in pre-existing stream valleys than on the adjacent highland topography. These stream valleys were scoured and deepened by the advancing glacial front. Glacial ice advanced and retreated at different intervals during the Pleistocene epoch. This advance and retreat of ice was caused by changes in climatic conditions. Four major stages of Pleistocene glacial advance have been identified in the midwestern United States. These stages, in ascending stratigraphic sequence, are the Nebraskan, Kansan, Illinoian, and Wisconsin. Each of these stages is separated by periods of warmer climate and glacial retreat in which glacial ice was removed from the entire topographic landscape (Totten 1973).

Pleistocene glaciation advanced into northeastern Ohio and Richland County during the Illinoian and Wisconsin stages. These glacial advances occurred in the Killbuck and Grand River glacial lobes. The glacial ice that covered Richland County was part of the Killbuck lobe (Totten 1973).

The Illinoian and Wisconsin stages have been divided into substages of Pleistocene glaciation. These stages and their relationship to major glacial stages and approximate ages in geological time are illustrated in Table III.1. During each of these substages, several individual periods of glacial advance and retreat have been documented (Totten 1973).

Pleistocene glaciation deposited unconsolidated sediments (glacial drift) throughout Richland County and much of northeastern Ohio. Glacial sediments were transported during stages and substages of glacial advance. These sediments were deposited by melting and receding glaciers. Glacial deposition

SciTek

Source: Totten 1973

Glacial Deposits in Richland County, Ohio

Epoch	Stage	Substage	Killbuck lobe: Unit or interval	Killbuck lobe: Material	Scioto lobe: Unit or interval	Scioto lobe: Material	Approximate dates (years B.P.)
Pleistocene	Wisconsinan	Woodfordian	Postglacial Late glacial	Alluvium, peat, loess, lacustrine silt and clay	Postglacial Late glacial	Alluvium, peat, loess lacustrine silt and clay	Present
			Hiram Till	Dark-brown clayey till	Centerburg Till	Dark-brown silty till	14,300
			Ice retreat	Loess	Ice retreat	Loess	14,500
			Hayesville Till	Dark-brown silty till	Mt. Liberty Till	Dark-yellow-brown silty till	14,700
			Erie Interval	Loess	Erie Interval	Loess	15,000
			Navarre Till	Yellow-brown sandy till	Knox Lake Till	Yellow-brown sandy till	18,000
		Farmdalian	Ice retreat	Paleosol, loess	Ice retreat	Paleosol, loess	24,000
		Altonian	Millbrook Till (two sheets?)	Olive-brown sandy till	Jelloway Till	Olive-brown sandy till	28,000
	Sangamonian (?)		Prolonged ice retreat	Paleosol	Prolonged ice retreat	Paleosol	75,000(?)
	Illinoian		Butler Till	Yellow-brown silty till	Butler Till	Yellow-brown silty till	(?)
			Ice retreat	Loess(?)	No lobe distinction made in older deposits; units and material probably similar in both lobes		
			Unnamed till	Silty, sandy till			
			Ice retreat	Loess(?)			
			Unnamed till	Silty, sandy till			
	Pre-Illinoian(?)		Weathered till and gravel				

Table III.1.

occurred at numerous intervals during the Pleistocene Epoch (Totten 1973; White 1987).

Glacial deposits vary in thickness from one locality to another. Glacial deposits throughout Richland County range from 20 to 300 feet. The thicker glacial deposits are concentrated in buried valleys that are presently occupied by surface streams (Totten 1973; White 1987).

Glacial deposits within Richland County and northeastern Ohio are classified as till, outwash, and kettles. Till sediments are unstratified sections of silt, clay, and sand with frequent interfingering facies changes. Individual tills were deposited during each substage of the Illinoian and Wisconsin stages (Table III.1). Individual tills are composed of a characteristic sediment lithology. Till thickness varies from one locality to another. Abrupt changes in till thickness occur in end moraines and buried glacial valleys (Totten 1973).

Glacial outwash consists of glacial sediments that were deposited by meltwater in front of receding glaciers. Glacial outwash sediments, which concentrate in buried valleys, are kames and valley trains. Glacial kames are gravel sediments deposited at the front of receding glaciers. Valley trains are fine grained silts, clays, and sands that were transported by meltwater and then deposited away from the glacial front (Totten 1973).

Glacial kettle deposits are sediments entrapped in a block of glacial ice that was separated from the receding glacial front. Glacial deposition that continued during the periods of glacial retreat frequently covered these isolated glacial blocks. When the buried glacial ice melted, the entrapped sediments were deposited as an anomalous lithology that was different from the surrounding sediments (Totten 1973).

The deposition of glacial drift affected the entire topographic landscape. End moraines formed along the maximum extent of glacial advance. End moraines are glacial land forms in which glacial sediments were pushed into elongated ridges. These end moraines are prominent along a northeast-southwest belt across northeastern Ohio. This end moraine belt lies across the northern portion of Richland

County (Figure III.2). The Base is located directly adjacent to this end moraine belt. The melting of glacial ice within buried kettle deposits resulted in topographic depressions. These depressions created circumstances for the development of lakes, marshes, swamps, etc. (Totten 1973; White 1987).

The bedrock that underlies glacial sediments throughout Richland County is predominately Mississippian age sedimentary rocks. Pennsylvanian sedimentary rocks underlie glacial drifts at a few isolated locations within the southeastern corner of Richland County (Figure III.3). The Mississippian system is a 500 to 600 foot section of sandstone, shale, and siltstone. The Mississippian stratigraphic sequence and formation lithology is illustrated in Table III.2. Each of these formations underlie glacial drift and/or crop-out within Richland county (Totten 1973).

The stratigraphy underlying the soil overburden at the Base is glacial drift. Illustrated in Figure III.4 are isopach contours that map glacial drift thickness at the Base and in its immediate vicinity. These isopachs show that glacial drift at the Base is approximately 50-feet thick. The uppermost glacial material is the Hayesville Till. Underlying the Hayesville Till in descending stratigraphic sequence are the Navarre, Millbrook, and Butler tills. A brief description of each till, including glacial stage, composition, and average till thickness, is presented in Table III.1 (Vormelker 1984).

The bedrock that underlies glacial drift at the Base is the Mississippian age Cuyahoga Formation. Lithologically, the Cuyahoga is an interbedded sequence of shales and coarse-grained conglomeritic sandstones. The total thickness of the Cuyahoga Formation is estimated to range from 300 to 400 feet (Totten 1973).

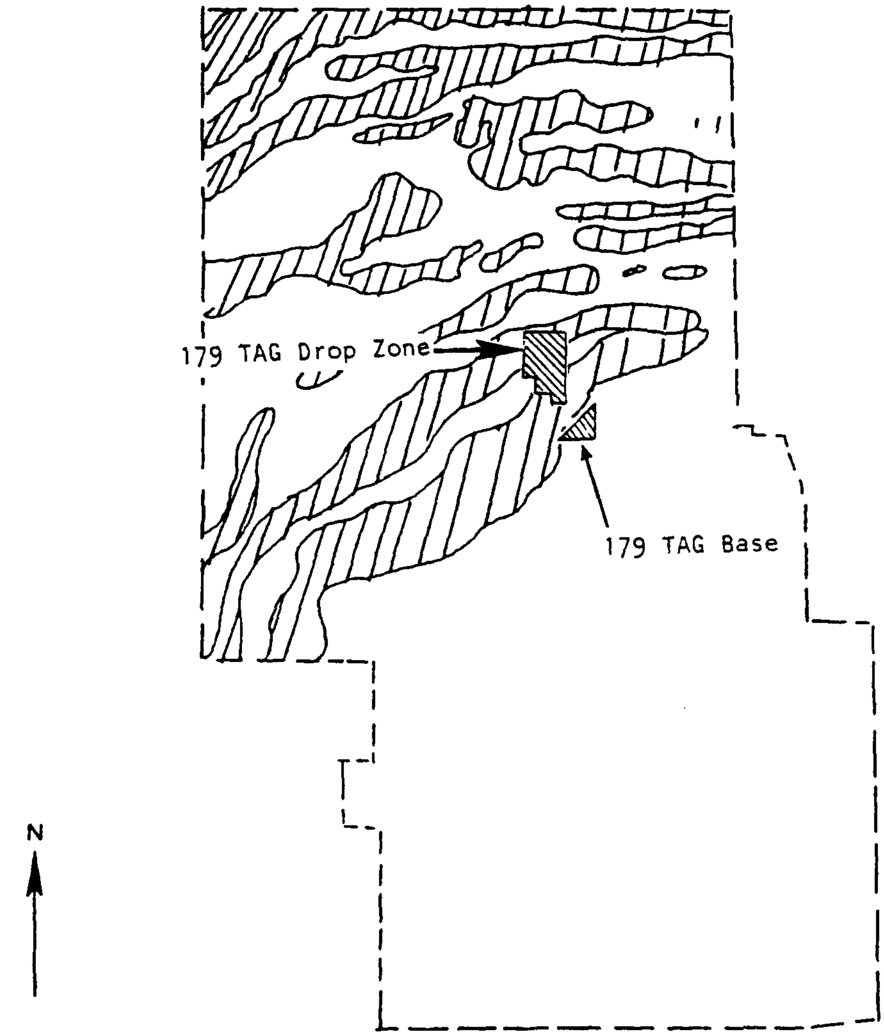
C. SOILS

The United States Department of Agriculture (USDA), Soil Conservation Service (SCS) has concluded that soils both on the Base and at Mansfield Lahm Airport are cut and fill soils (Cz) (Figure III.5). The natural soil was removed by excavation during the construction of the Base and airport facilities.

SciTek

Source: Totten 1973

Glacial End Moraines in Richland County, Ohio



LEGEND

Glacial End Moraines

County Boundary

Not to Scale

Figure III.2.

SciTek

Source: Totten 1973

Geologic Bedrock Map of
Richland County, Ohio

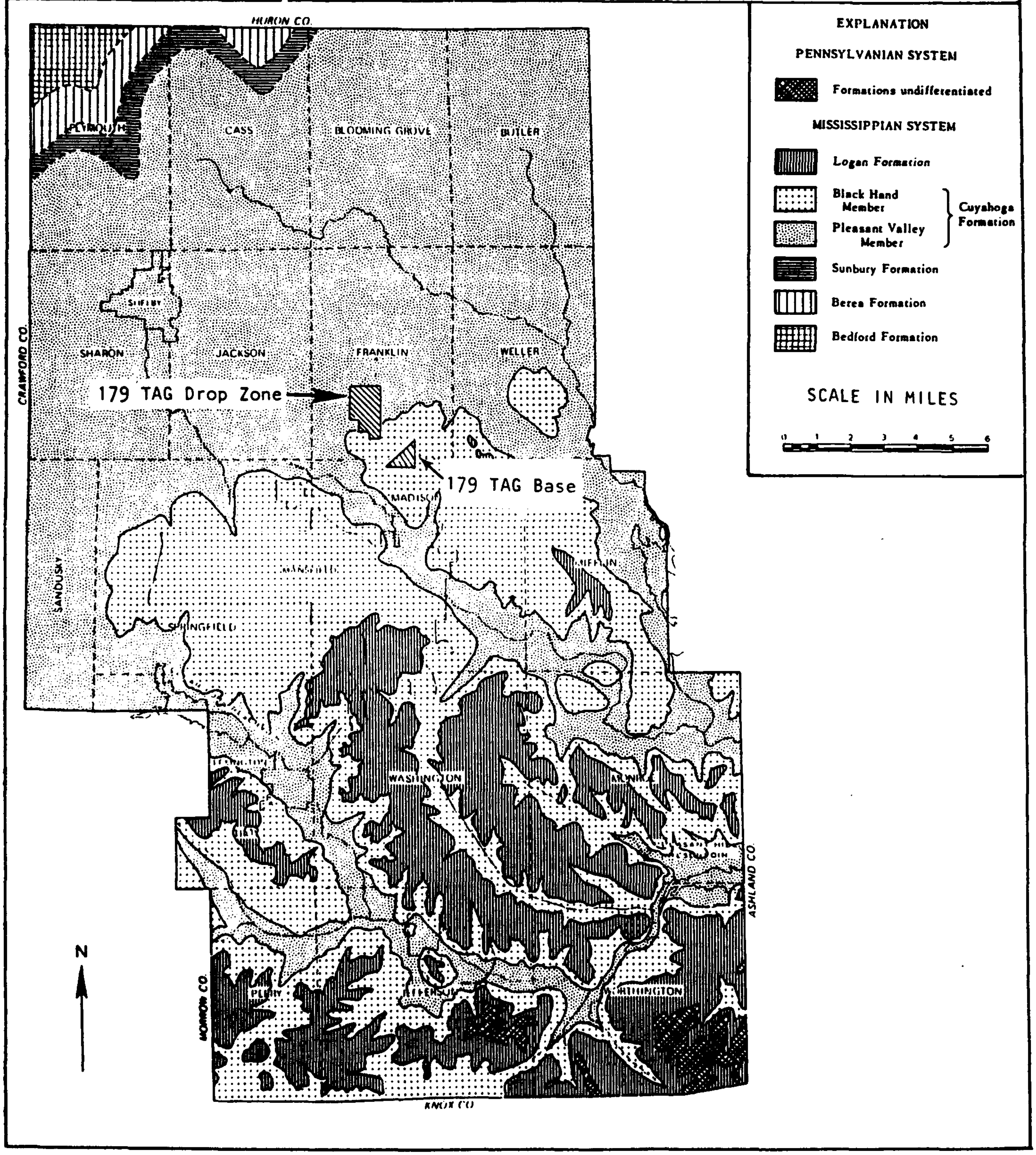


Figure III.3.

SciTek

Source: Pree 1962

Bedrock and Glacial Drift Stratigraphic Section for Richland County, Ohio

System or Series		Group or Formation	Character or Material
Quaternary	Recent		Alluvium composed primarily of clay and silt, with few thin lenses of sand and gravel, deposited on flood plains of principal rivers.
	Pleistocene		Thick lenses of sand and gravel interbedded with thin layers of till in buried valleys.
			Thick morainal deposits consisting of thin lenses of sand and gravel interbedded with thick till.
			Till, consisting predominantly of clay with few thin lenses or beds of sand and gravel of limited areal extent.
			Thin lenses of beds of sand and gravel interbedded with thick layers of till in buried valleys.
Pennsylvanian		Pottsville	Thin sandstone and shale, with some coal, clay, and small amounts of coarse sand.
Mississippian		Logan	Fine-grained sandstones with interbedded shales.
		Cuyahoga	Alternating sandstone and shale
		Sunbury	Brown to black, fissile, laminated, carbonaceous shale.
		Berea	Gray to bluish-gray, thin - to massive-bedded, fine-grained sandstone with occasional thin shale partings

Table III.2.

SciTek

Source: Vormelker 1984

Glacial Drift Isopach Map for Glacial Drift That Underlies the 179 TAG Base, Mansfield Lahm Airport, Mansfield, Ohio and Adjacent Vicinity

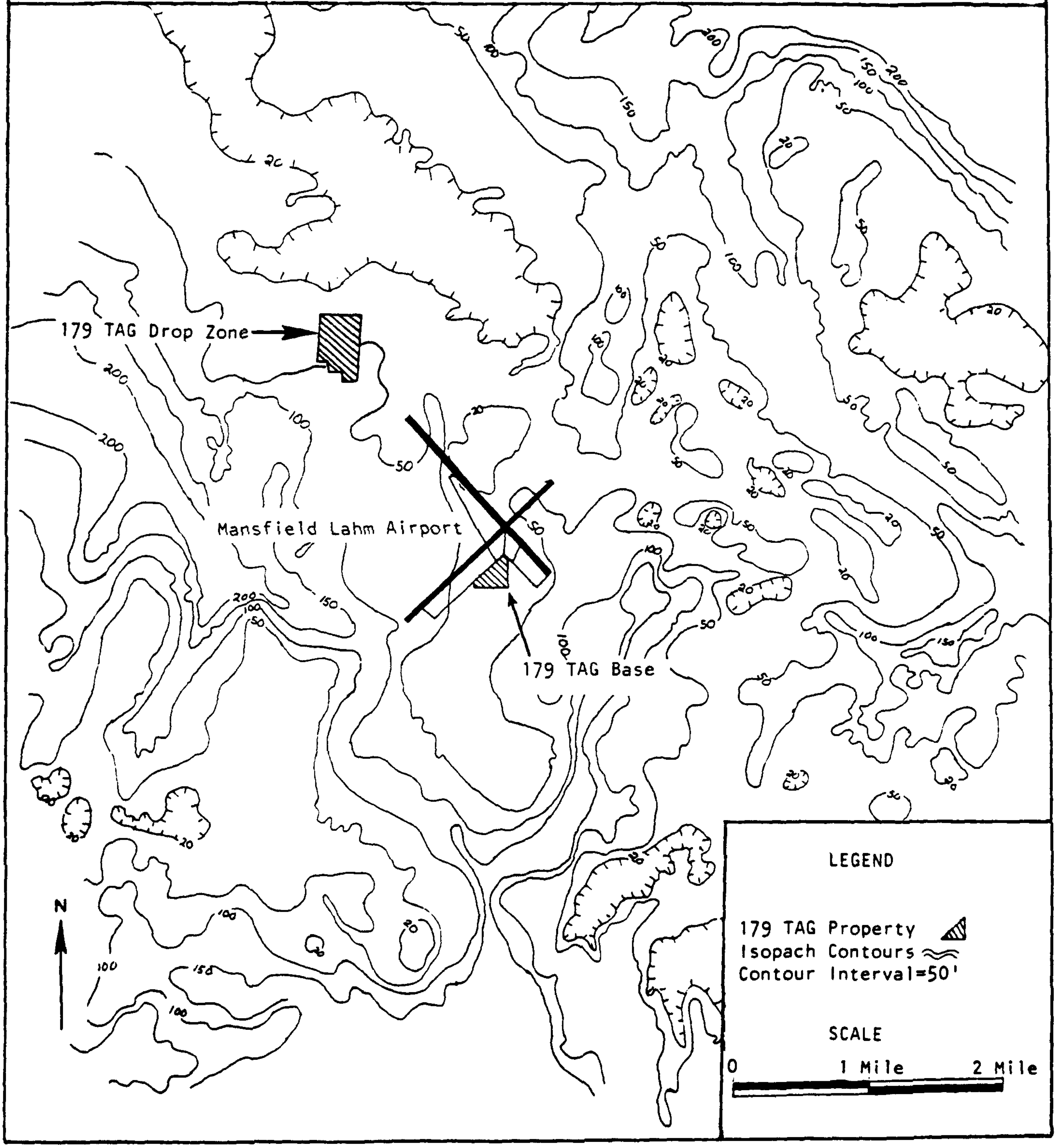


Figure III.4.

SciTek

Soils Map for the 179 TAG Base and Adjacent Vicinity, Mansfield, Ohio

Source: Redmond et al 1975

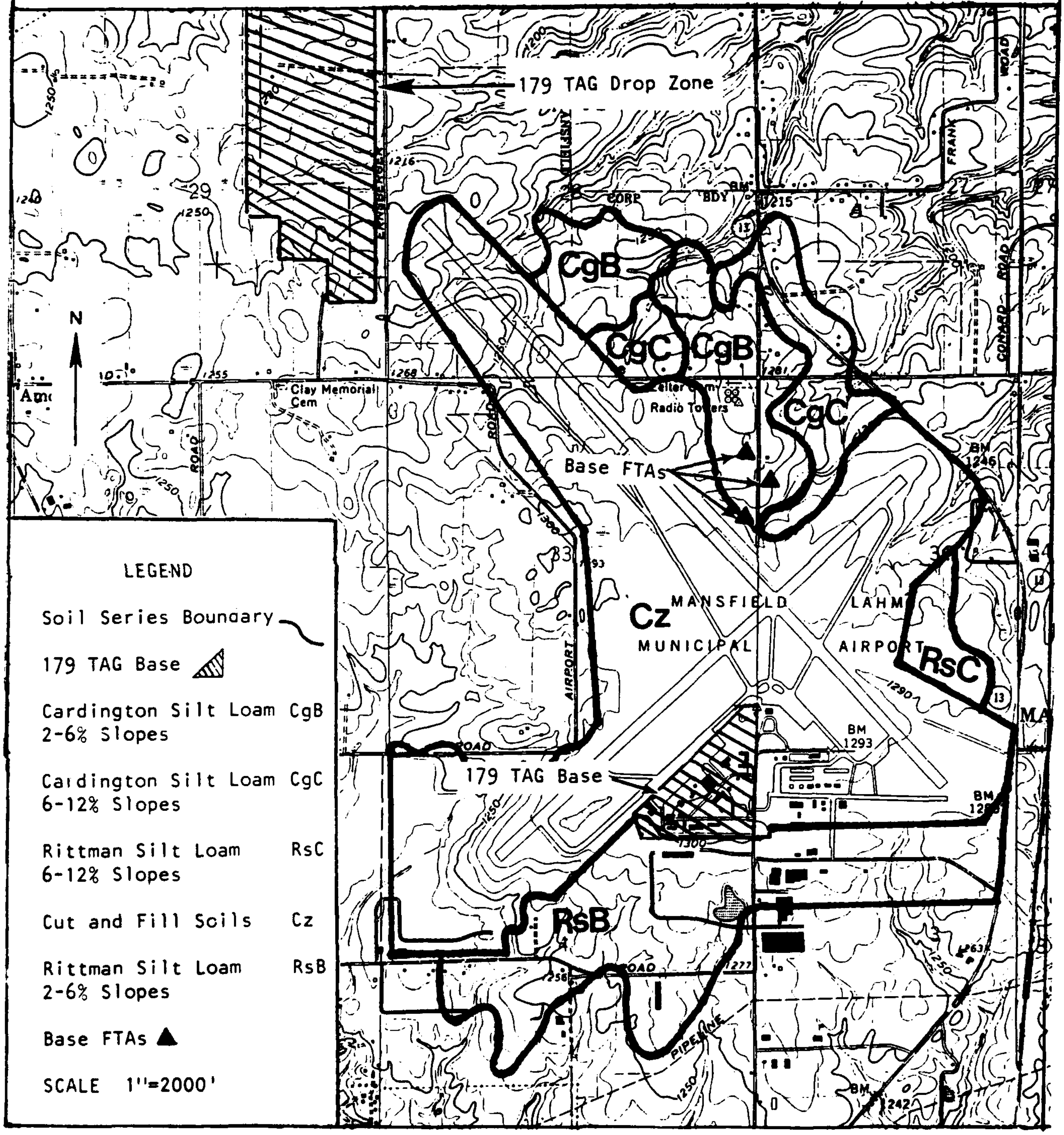


Figure III.5.

Soils from adjoining areas were used as backfill and landscaping material.

Soil borings have been drilled at the Base to evaluate subsurface conditions prior to construction activities. These borings, which were drilled to a maximum depth of 15 feet, indicate that the soil is composed of clayey silt, sandy clayey silt, sand, and gravel. The logs of these borings are included in Appendix G.

The soils south and northeast of the Base belong to the Rittman soil series (Figure III.5). Rittman series soil types that occur in these areas are Rittman silt loam (RsB), 2-6% slopes and Rittman silt loam (RsC), 6-12% slopes (Figure III.5). Soils within the Rittman series develop from glacial till that is low in lime content. The following is a typical vertical soil profile for all Rittman series soil types: 0-7, inches silty clay; 7-13 inches, silty clay loam; and 13-42 inches, silty clay. Permeability, which was calculated to a depth of 5 feet, ranges from 0.63 to 2.0 inches/hour. Glacial drift is commonly penetrated 5 to 10 feet below the land surface (Redmond et al 1975).

Soils that underlie the Base Fire Training Areas, approximately 2,500 feet north of the Base boundary, belong to the Cardington series Figure III.5. Cardington soil types that occur in this area are Cardington silt loam (CgB), 2-6% slopes and Cardington silt loam (CgC), 6-12% slopes. The following is a typical vertical soil profile for all Cardington soil types: 0-15 inches, silt loam; 15-34 inches, silt clay loam; and 30-64 inches, clay loam with gravel pebbles. Gravel particles comprise 2 to 10% of the total soil composition. Soil permeability, which was calculated to a depth of 5 feet, ranges from 0.63 to 2.0 inches/hour. Glacial till is commonly penetrated 5 feet below ground surface (Redmond et al 1975).

D. HYDROGEOLOGY

1. Surface Water

Surface runoff within the Base complex is collected in a series of man-made ditches, storm sewers, and drainage swales (Figure III.6). The majority of the Base's surface runoff is discharged at a storm drain outfall

SciTek

Source: 179 TAG Civil Engineering

179 TAG Base Surface Water and Storm Sewer Drainage Map, Mansfield Lahm Airport, Mansfield, Ohio

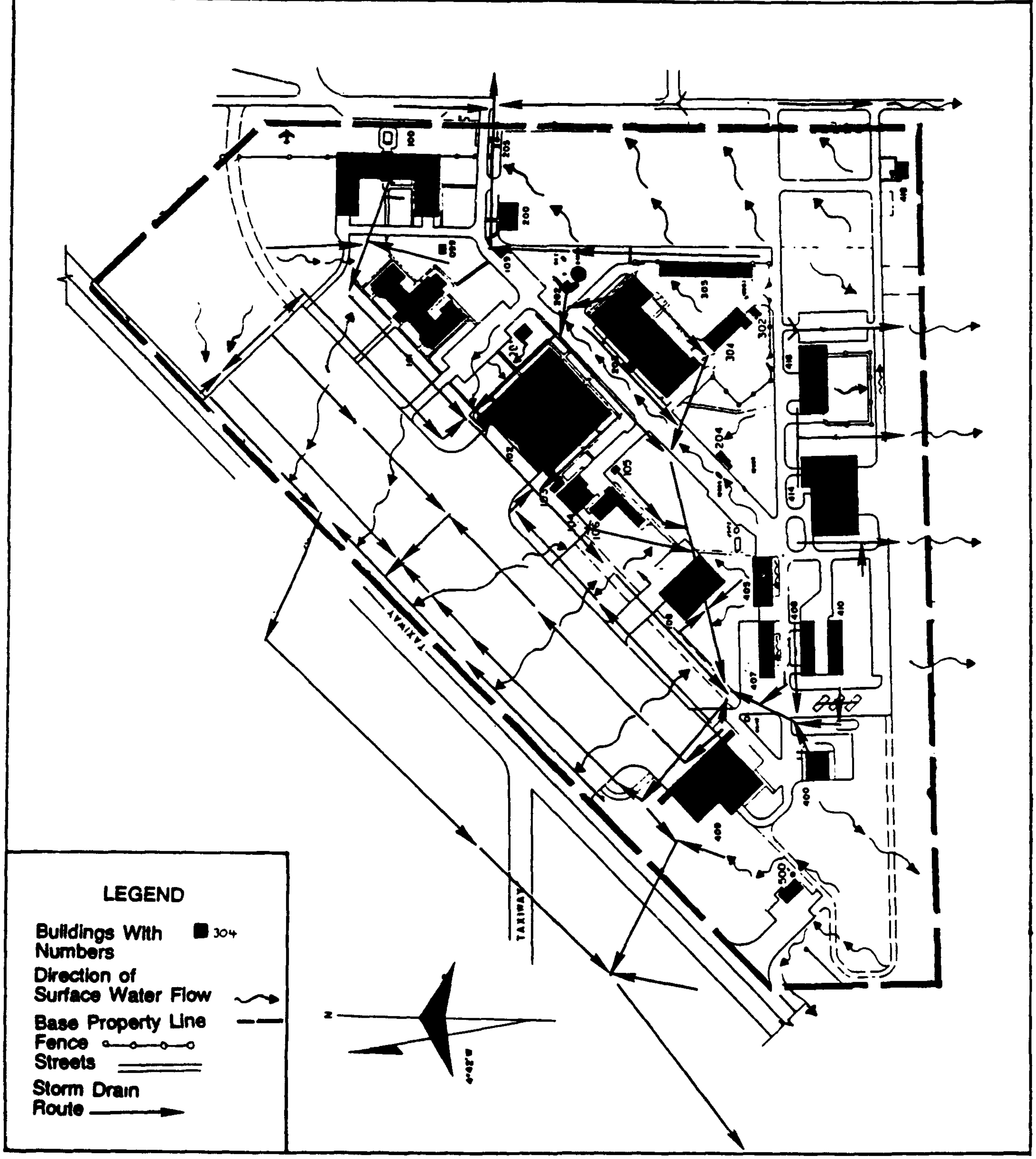


Figure III.6.

approximately 1000 feet west of the Base boundary. Smaller amounts of Base runoff are discharged at open ditches along the Base's southeastern, southern, and western boundaries. All of the Base runoff (except a small amount that flows into an unnamed fishing and recreational pond 1000 feet south of the Base) flows to the south and discharges into Rocky Fork Creek approximately 4 miles from the Base's southern boundary. Rocky Fork Creek flows to the southeast and joins the Mohican River approximately 10 miles southeast of the Base. The Base is located in the Mohican River Drainage Basin.

The Base and Mansfield Lahm Airport lie astride a localized drainage divide. This drainage divide along with surface runoff flow routes is illustrated in Figure III.7. Surface runoff that drains from the vicinity of the Base's FTAs, which are located approximately 2500 feet north of the Base on Mansfield Lahm Airport property, flows north-northeast into Brubaker Creek. Brubaker Creek is also a tributary of the Mohican River.

2. **Groundwater**

Groundwater aquifers in Richland County reside within Mississippian age sedimentary rocks and Pleistocene glacial deposits. The most productive aquifers that are associated with glacial deposits are concentrated in buried glacial valleys. Mississippian age sedimentary rocks produce groundwater from sandstone aquifers.

The principal aquifers within the Base boundaries and in their immediate vicinity occur within the Mississippian-age Cuyahoga Formation. Multiple aquifers occur throughout the Cuyahoga Formation at various stratigraphic intervals. These aquifers produce from sandstone intervals characterized by intergranular porosity and fracture permeability. Vertical communication between these aquifers may occur via fracture permeability (Schmidt 1979).

SciTek

Source: USGS, 7.5 Minute Series, Mansfield North, Ohio 1960 and Pavonia, Ohio 1960

Surface Drainage Routes for the 179 TAG Base Outfall and Surface Drainage Routes for Base FTAs

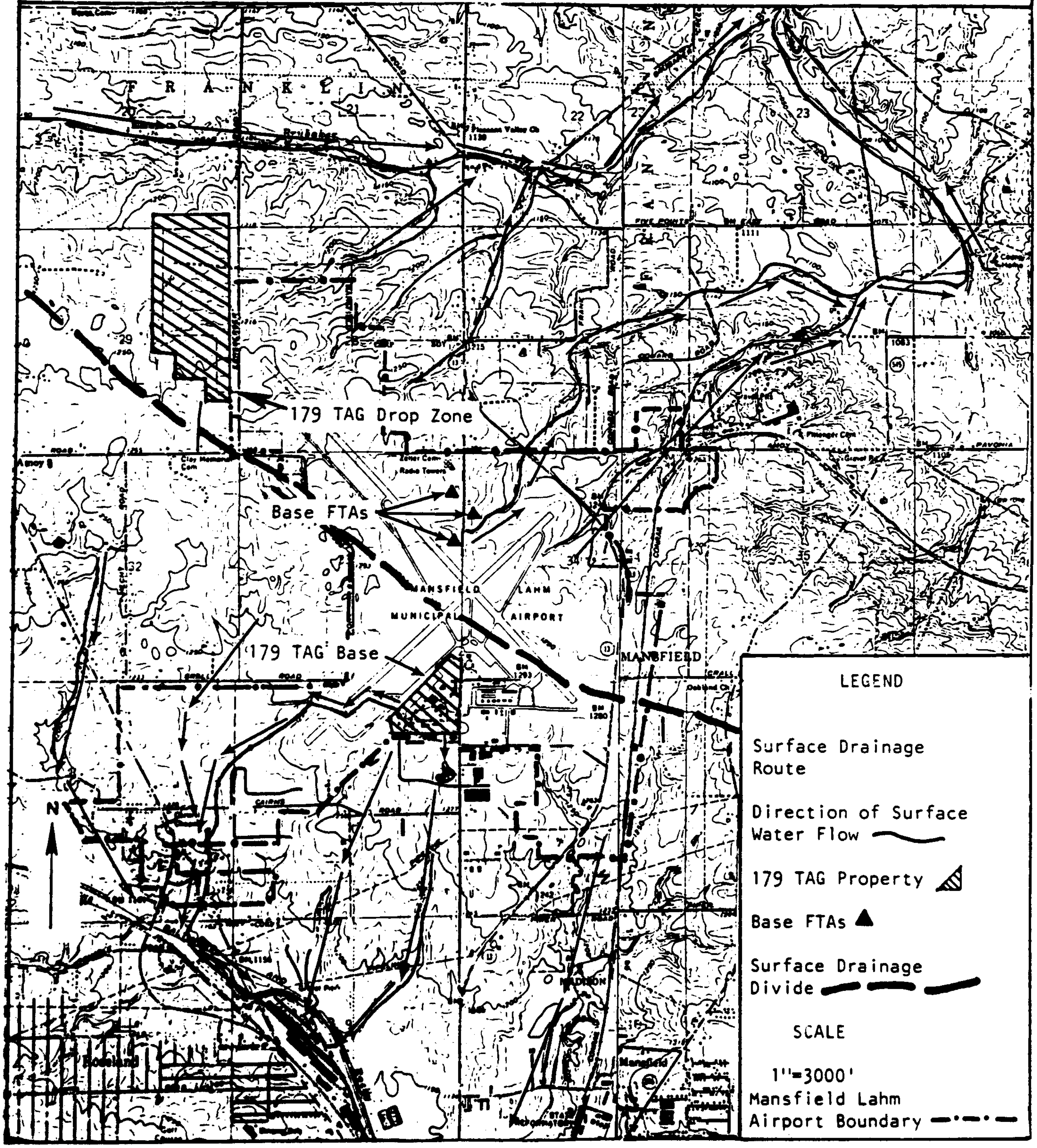


Figure III.7.

Aquifers that occur within the Cuyahoga Formation are the most widespread groundwater source in Richland County. As illustrated in Figure III.8, a large area (possibly 80 percent) of Richland County uses the Cuyahoga aquifer as a groundwater source (Schmidt 1979).

Potable water wells, which tap into the Cuyahoga aquifer, produce from depths that range from 50 to 350 feet below land surface. The groundwater yield for these potable wells ranges from 2 to 250 gallons per minute (GPM) with an average yield of 12 GPM. Variations in the groundwater production from individual wells is affected by factors such as sandstone thickness, porosity, permeability, etc. (Pree 1962).

Illustrated in Figure III.9 are the potable water wells surrounding the Base boundary. Well records for each of these potable wells are available at the Ohio Department of Natural Resources, Division of Water, Groundwater Resources Section. Each of these wells produces from the Cuyahoga aquifer. Also, each of these wells is used for a domestic rather than municipal water supply. One potable water well is located directly adjacent to the Base FTAs (Figure III.9). On-site observation by the Preliminary Assessment team during the initial site visit indicated that this well is now abandoned and, therefore, not used as a potable water source.

The Cuyahoga aquifers are recharged by percolating surface water that originates in topographic areas where the Cuyahoga crops out in Richland County. Also, shallow groundwater stored in the overlying glacial till and/or soil overburden may contribute to the Cuyahoga aquifer recharge. This shallow water table fluctuates with the seasonal precipitation. The seasonal high water table ranges from 1.5 to 2.5 feet below land surface (Redmond et al 1975). Each of the aquifers throughout the Cuyahoga Formation discharges into the local surface streams. Groundwater that underlies the Base will discharge into Rocky Fork Creek 2 miles southwest of the Base boundary.

SciTek

Source: Schmidt 1979

Richland County, Ohio Map Illustrating Areal Distribution of the Cuyahoga Aquifer and Buried Glacial Valley Aquifers

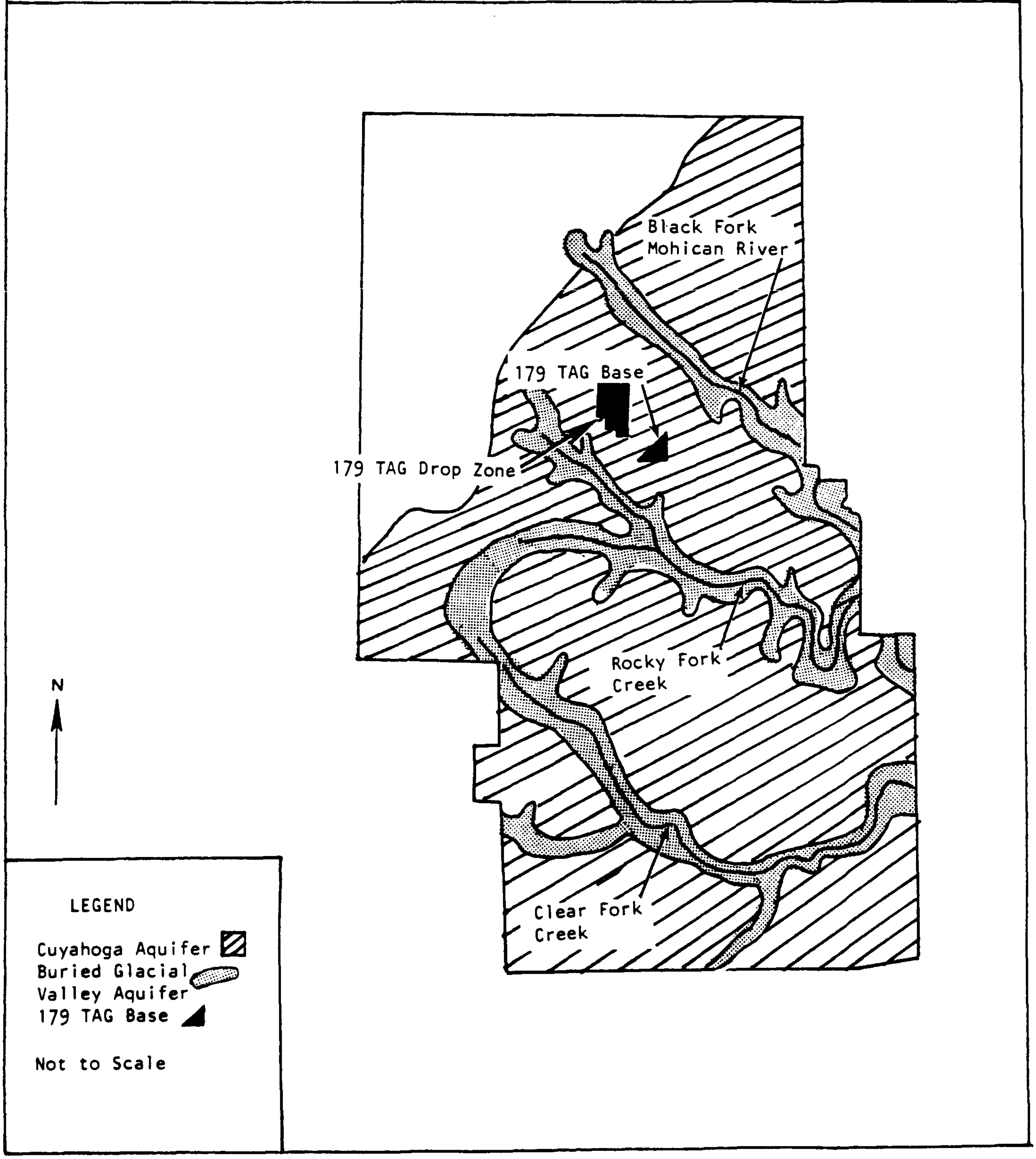


Figure III.8.

SciTek

Source: USGS, 7.5 Minute Series, Mansfield North, Ohio 1960 and Pavonia, Ohio 1960

Potable Water Wells at the 179 TAG Base and Surrounding Vicinity, Mansfield, Ohio

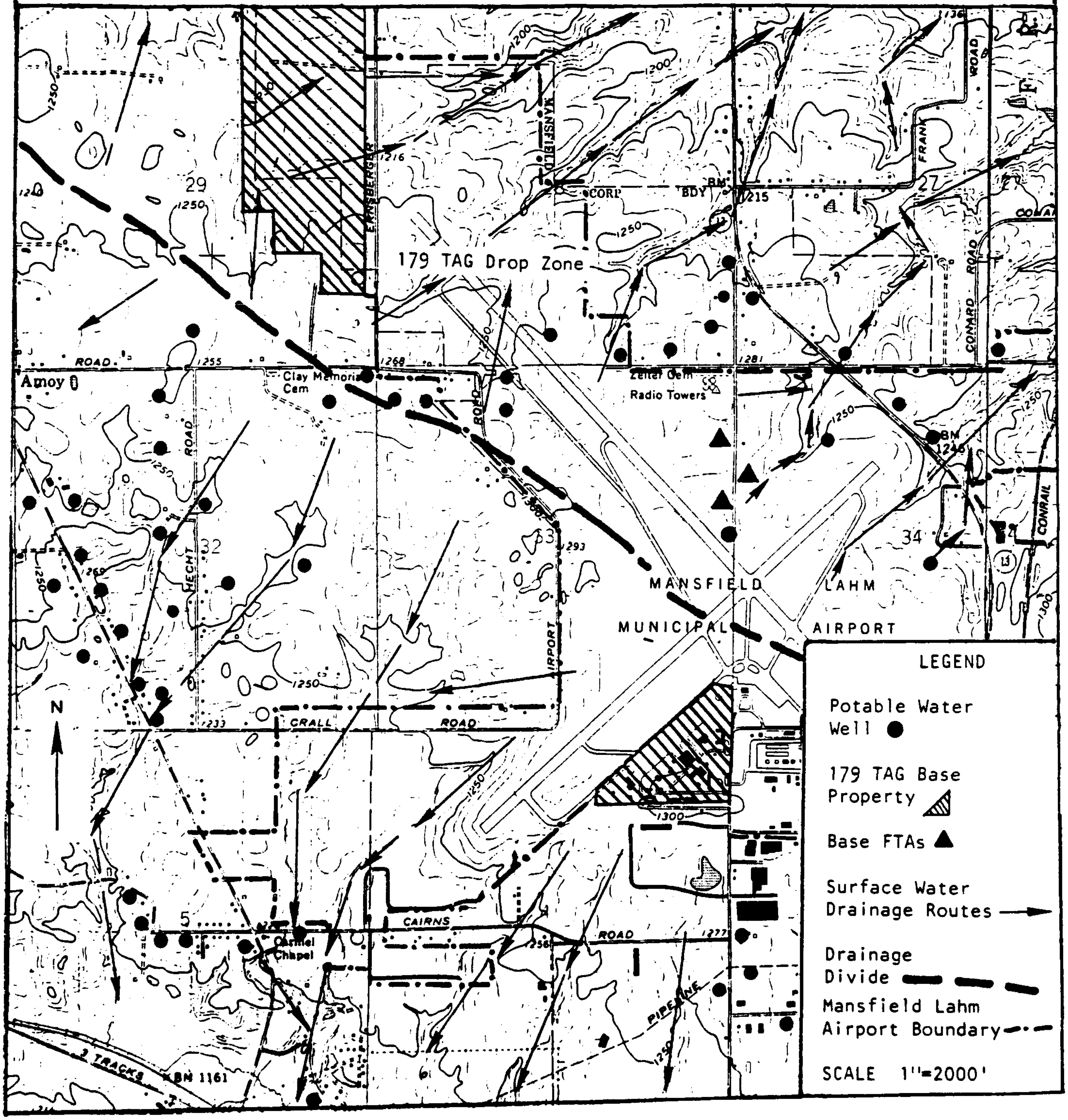


Figure III.9.

Groundwater that underlies the Base Fire Training Areas (which will be described in Section IV of this report) will discharge to the northeast into Brubaker Creek.

Aquifers that produce from buried glacial valleys are concentrated along the surface stream valleys of Rocky Fork Creek, Clear Fork Creek, and Black Fork Creek. There is no buried glacial valley beneath the Base. The glacial valley aquifers nearest to the Base concentrate along Rocky Fork Creek, approximately 1 mile southwest of the Base. Figure III.8 shows the aquifer perimeters for buried glacial valleys throughout Richland County (Pree 1962).

The groundwater aquifers in buried glacial valleys produce from thick sections of unconsolidated glacial sediments. These deposits are predominately kame and kame terrace deposits. Groundwater is produced from permeable sections of gravel, sand, and silt. The aquifers are recharged by the discharge of groundwater from Mississippian age sandstone aquifers or the overlying surface stream (White 1982).

Aquifers that concentrate in buried glacial valleys are the most productive sources of groundwater in Richland County. The yield for potable water wells within these aquifers ranges from 200 to 1000 GPM. The total depth for these potable wells ranges from 125 to 200 feet below land surface.

The water supply for the Base is municipal water purchased from the city of Mansfield, Ohio. Mansfield obtains its water from the Clear Fork Reservoir, located approximately 6 miles southwest of the Base. Also, a portion of this municipal water is produced from municipal water wells. These wells, which produce from glacial valley sediments, were drilled along Clear Fork Creek, situated approximately 7 miles south-southwest of the Base.

One potable water well is located within the Base boundary. This well was the domestic water source for the Base during the 1950s, 1960s, and early 1970s. When municipal water became available to the Base, this well was no longer used as a source of drinking water. While the water from it was potable at the time of chargeover, hooking onto municipal water relieved the Base of continuous maintenance problems associated with the water softener and chlorinator used to treat the well water. Presently, water pumped from this well is used for washing vehicles and other maintenance operations. It is capable of producing 60 GPM from the Cuyahoga aquifer. The total depth of this well is 300 feet below land surface.

Groundwater pumped from both glacial sediments and the Cuyahoga aquifer is of good quality. The hardness of water pumped from glacial deposits is much greater than that from the Cuyahoga aquifer. The major constituents of groundwater samples taken throughout Richland County and their concentrations are presented in Table III.3.

Correspondence with the Richland County Planning Commission indicated that municipal water lines have been constructed in the vicinity of the Base. However, as illustrated in Figure III.9, potable water wells are still a major water source for domestic consumption in this area. Some of these water wells are located approximately 2000 feet south of the Base boundary.

The shallow water table, which has a seasonal high fluctuation of 1.5 to 2.5 feet below ground surface, has potential to become contaminated if a hazardous substance is released. With no underlying and confining aquiclude, the deeper Cuyahoga aquifers may become contaminated by vertical groundwater migration and recharge. Furthermore, groundwater movement and discharge of the Cuyahoga aquifers could potentially contaminate aquifers that concentrate within buried glacial valleys.

E. CRITICAL HABITATS/ENDANGERED OR THREATENED SPECIES

A critical habitat is a specific area within the geographic range of a species that is essential for the preservation of that species and that may require special protection. No

TABLE III.3

TYPICAL GROUNDWATER COMPONENTS AND CHARACTERISTICS FOR AQUIFERS IN RICHLAND COUNTY, OHIO

Characteristics & Constituents	Water-bearing Formation			
	Sand & Gravel	Sand	Sandstone	Gravel
Iron (ppm)	0.4	15.0	0.05	0.4
Chloride (ppm)	6.0	10.0	2.0	2.0
Dissolved Solids (ppm)	448.0	1314.0	226.0	290.0
Total Hardness (ppm of CaCO3)	321.0	883.0	145.0	258.0
pH	7.4	6.7	7.0	7.6

Source: Pree 1962

critical habitats have been identified on the Base or on areas adjoining it.

None of the plant and animal species listed as endangered or threatened by the U.S. Fish and Wildlife Service and the Ohio Department of Natural Resources, Division of Natural Areas and Preserves has been positively identified on Base land or areas adjacent to it. However, *Populus heterophylla* (Swamp Cottonwood), listed as a threatened species by the state, has been identified in a small, isolated wetland area four miles northwest of the Base in Section 24, Jackson Township.

Phegopteris connectilis (Long Beech-fern) has been identified 3-4 miles southwest of the Base on a small stream bank located immediately south of Poth Road and adjacent to the Mansfield Corporate Boundary (West) in Section 7 of Springfield Township. The state has listed this plant as a Potentially Threatened Species. However, this designation has no legal status.

These plant species and their habitats are in no way threatened by potential water-borne pollutants from the Base. The surface water and migrant groundwater from the Base do not drain to these locations.

IV. SITE EVALUATION

A. ACTIVITY REVIEW

The review of Base records plus interviews with present and former Base personnel identified specific operations in which the majority of hazardous materials and/or hazardous wastes are used, stored, processed, and disposed. Table IV.1 summarizes the major operations associated with each activity. If an item is not listed in the table on a best-estimated basis, that activity or operation produces negligible (estimated less than 5 gallons per year) waste requiring disposal.

The liquid fuel system at the Base receives, stores, and dispenses JP-4. The POL facility receives JP-4 by tanker trucks and stores it in four 25,000-gallon underground storage tanks (USTs) until needed. Motor fuels are received, stored, and dispensed by Vehicle Maintenance. Heating oil is received and stored at various buildings by Base Civil Engineering.

Data on USTs, underground heating fuel tanks and oil/water separators, and miscellaneous underground tanks are provided on Tables E.1 thru E.3 in Appendix E. The approximate location of each of these facilities is shown on Figures E.1 thru E.3 in the same appendix.

B. DISPOSAL/SPILL SITE INFORMATION, EVALUATION, AND HAZARD ASSESSMENT

Interviews with 30 Base personnel and subsequent site visits identified a total of eight potential sites that may be contaminated as a result of past Base operations. Each of these sites was rated by application of the United States Air Force (USAF) HARM (Appendix C), and since the potential for contaminant migration exists at these sites, each is recommended for further investigation under the IRP program.

Copies of completed HARM forms and an explanation of the factor rating criteria used for site scoring are contained in Appendix D.

TABLE IV.1

Hazardous Materials/Hazardous Wastes Disposal Summary
179th Tactical Airlift Group

Shop	Building	Hazardous Materials	Est. Qty. Used Gal/Yr	1950	1960	1970	1980	1985	1988
Aircraft Maintenance	102	PD-680	500		FTA			DRMO	
Phase Dock		Trichloroethane	60		FTA		NLU		
Unscheduled Maint.		Battery Acid	20		STOR		NSAN		
Flight Line		Carbon Cleaner	3				PROC		
		MEK	18				PROC		
		Synthetic Turbine Oil	125		NU	FTA		DRMO	
		JP-4	55				FTA		
		Sulfuric Acid	32		STOR		NSAN		
		7808 Oil	125		FTA			DRMO	
		Hydraulic Oil	175		FTA			DRMO	
		AVGAS	10		FTA		NLU		
		Cleaning Compound	241		FTA		NLU		
		PS 661	330		FTA			NLU	
		ISO Solvent	75		NU			DRMO	
Engine Shop	108	PD-680	300		FTA			DRMO	
Propulsion Shop		MEK	20				PROC		
		7808	500		FTA			DRMO	
		Hydraulic Oil	100		FTA			DRMO	
		Synthetic Turbine Oil	3200		NU	DPDO		DRMO	

Table IV.1
(continued)

<table>
<tr><th>Shop</th><th>Building</th><th>Hazardous Materials</th><th>Est. Qty. Used Gal/Yr</th><th colspan="5">1950 | 1960 | 1970 | 1980 | 1985 | 1988</th></tr>
<tr><td>Aerospace</td><td>414</td><td>Engine Oil</td><td>100</td><td>UNK</td><td>FTA</td><td colspan="3">DRMO</td></tr>
<tr><td>Ground</td><td></td><td>Hydraulic Oil</td><td>5</td><td colspan="2">UNK</td><td>FTA</td><td colspan="2">DRMO</td></tr>
<tr><td>Equipment</td><td></td><td>JP-4</td><td>15</td><td colspan="5">FTA</td></tr>
<tr><td></td><td></td><td>PD-680</td><td>100</td><td colspan="3">STOR</td><td colspan="2">DRMO</td></tr>
<tr><td></td><td></td><td>Turbine Oil</td><td>5</td><td colspan="3">FTA</td><td colspan="2">DRMO</td></tr>
<tr><td></td><td></td><td>Battery Acid</td><td>10</td><td colspan="5">NSAN</td></tr>
<tr><td></td><td></td><td>Water-Soluble Degreaser</td><td>5</td><td colspan="5">PROC</td></tr>
<tr><td>Non-Destructive</td><td>414</td><td>Penetrant</td><td>25</td><td colspan="2">UNK</td><td>DPDO</td><td colspan="2">DRMO</td></tr>
<tr><td>Inspection (NDI)</td><td></td><td>Emulsifier</td><td>150</td><td colspan="2">UNK</td><td>DPDO</td><td colspan="2">DRMO</td></tr>
<tr><td></td><td></td><td>Developer</td><td>150</td><td colspan="2">UNK</td><td>DPDO</td><td colspan="2">DRMO</td></tr>
<tr><td></td><td></td><td>Fixer</td><td>20</td><td colspan="2">UNK</td><td colspan="3">REC</td></tr>
<tr><td></td><td></td><td>14AM Magnaglo</td><td>10</td><td colspan="3">UNK</td><td colspan="2">DRMO</td></tr>
<tr><td>Corrosion</td><td>414</td><td>Thinners</td><td>144</td><td>UNK</td><td>FTA</td><td colspan="3">PROC</td></tr>
<tr><td>Control</td><td></td><td>Paint Stripper</td><td>35</td><td>UNK</td><td>FTA</td><td>DPDO</td><td colspan="2">DRMO</td></tr>
<tr><td></td><td></td><td>Primer</td><td>3.5</td><td colspan="5">PROC</td></tr>
<tr><td></td><td></td><td>MEK</td><td>8</td><td colspan="5">PROC</td></tr>
<tr><td></td><td></td><td>Pigment Alum TTP</td><td>2 lb.</td><td colspan="2">UNK</td><td>FTA</td><td>CONTR</td><td>DRMO</td></tr>
<tr><td></td><td></td><td>Poly Coating</td><td>10</td><td colspan="2">UNK</td><td>FTA</td><td colspan="2">DRMO</td></tr>
<tr><td></td><td></td><td>Cleaners/Remover</td><td>126</td><td colspan="2">UNK</td><td>FTA</td><td colspan="2">DRMO</td></tr>
<tr><td></td><td></td><td>Corrosion Preventative</td><td>3</td><td colspan="5">PROC</td></tr>
<tr><td></td><td></td><td>Enamel</td><td>13</td><td colspan="2">UNK</td><td>FTA</td><td colspan="2">DRMO</td></tr>
<tr><td>Paint Shop</td><td>414</td><td>Thinners</td><td>40</td><td colspan="5">PROC</td></tr>
<tr><td></td><td></td><td>Stripper Residual</td><td>20</td><td>UNK</td><td>FTA</td><td colspan="3">DRMO</td></tr>
<tr><td></td><td></td><td>MEK</td><td>15</td><td colspan="5">PROC</td></tr>
</table>

Table IV.1
(continued)

<table>
<tr><th>Shop</th><th>Building</th><th>Hazardous Materials</th><th>Est. Qty. Used Gal/Yr</th><th>1950 | 1960 | 1970 | 1980 | 1985 | 1988</th></tr>
<tr><td>Machine Shop</td><td>414</td><td>Lubricating Oil</td><td>5</td><td>|..................PROC.....................|</td></tr>
<tr><td>Welding Shop</td><td>414</td><td>Cadmium Solution</td><td>1 qt.</td><td>|.....UNK.....|.............CONTR.............|</td></tr>
<tr><td>Weapons Maintenance</td><td>400</td><td>PD-680</td><td>500</td><td>|..NU.|..GRND.|.............NLU.............|</td></tr>
<tr><td>Photo Lab</td><td>416</td><td>Developer</td><td>75</td><td>|.....UNK.....|.............SAN.............|</td></tr>
<tr><td></td><td></td><td>Fixer</td><td>15</td><td>|.....UNK.....|.............REC.............|</td></tr>
<tr><td></td><td></td><td>NH-S Hypoconcentrate</td><td>40</td><td>|.UNK.|..STOR.|.............NLU.............|</td></tr>
<tr><td></td><td></td><td>Acetic Acid</td><td>4</td><td>|..................NSAN.....................|</td></tr>
<tr><td>Vehicle Maintenance</td><td>304</td><td>Engine Oil</td><td>1000</td><td>|.........FTA.........|.........DRMO..........|</td></tr>
<tr><td></td><td></td><td>PD-680</td><td>50</td><td>|.UNK.|..FTA..|.............DRMO.............|</td></tr>
<tr><td></td><td></td><td>Sulfuric Acid</td><td>50</td><td>|.UNK.|..GRND.|.............NSAN.............|</td></tr>
<tr><td></td><td></td><td>JP-4</td><td>300</td><td>|...................FTA.....................|</td></tr>
<tr><td></td><td></td><td>Ethylene Glycol</td><td>100</td><td>|.UNK.|................SAN..................|</td></tr>
<tr><td></td><td></td><td>Hydraulic Oil</td><td>100</td><td>|.UNK.|..FTA..|.............DRMO.............|</td></tr>
<tr><td></td><td></td><td>Transmission Fluid</td><td>20</td><td>|.UNK.|..FTA..|.............DRMO.............|</td></tr>
<tr><td></td><td></td><td>Paint Thinner</td><td>150</td><td>|.UNK.|..FTA..|.............DRMO.............|</td></tr>
<tr><td></td><td></td><td>Brake Fluid</td><td>5</td><td>|.UNK.|..FTA..|.............DRMO.............|</td></tr>
<tr><td></td><td></td><td>Diesel Fluid</td><td>20</td><td>|.UNK.|..FTA..|.............DRMO.............|</td></tr>
<tr><td>Fuels Management</td><td>204</td><td>JP-4</td><td>3500</td><td>|..................FTA.....................|</td></tr>
<tr><td></td><td></td><td>Tank Cleaning Sludge</td><td>50</td><td>|.....UNK.....|.............CONTR.............|</td></tr>
</table>

Table IV.1
(continued)

Acronyms

CONTR	- disposed of by Contractor
DPDO	- disposed through Defense Property Disposal Offices (DPDO)
DRMO	- disposed through Defense Reutilization and Marketing Office (DRMO)
FTA	- disposed of at Fire Training Area
GRND	- disposed of on ground
NLU	- no longer used
NSAN	- neutralized and disposed in sanitary sewer
NU	- not used
PROC	- material used up in process (i.e. evaporation)
REC	- recycled
SAN	- disposed in sanitary sewer
STOR	- disposed in storm drain
UNK	- unknown

NOTE: The various petroleum products and PD-680 disposed of through DRMO and DPDO are recycled by the contractor who picks them up from the Base.

Locations for the eight rated sites are provided on Figures IV.1 and IV.2.

The potential exists for contaminant migration at each of the eight rated sites. Contaminants that may have been released at these sites have potential to be transported by groundwater and surface water migration. The seasonal high water table, which is 1.5 to 2.5 feet below ground surface, has the highest risk for groundwater contamination. If the shallow groundwater becomes contaminated by a hazardous substance release, then the deeper aquifers may also be contaminated by groundwater migration. Released contaminants that are exposed on the ground surface have the potential to be transported by surface water migration into the Rocky Fork Creek and Brubaker Creek watersheds. The following subsections provide detailed descriptions of the eight potential sites.

SITE NO. 1, Fire Training Area (FTA) 1 (HAS-69)

Site No. 1 is a Fire Training Area (FTA) located on Mansfield Lahm Airport property, approximately 2500 feet north of the Base boundary. Past fire training exercises at this site were conducted solely by the Base. The location of Site No. 1 in relation to the Base and the Mansfield Lahm Airport is illustrated in Figure IV.1.

This site was a circular area measuring approximately 100-150 feet in diameter. An unlined, circular fire pit with gently sloping walls was located near the center of this area. A water base measuring 40-50 feet in diameter stood inside the pit. Situated inside this pit was a large, empty steel storage tank that had been modified to simulate an aircraft fuselage. Two narrow, excavated drainage channels, each measuring approximately 4 inches wide and 2 inches deep and apparently designed to drain fuel and water overflow from the pit, extended south into a heavily weeded area and southwest to the adjacent service road. Barren areas, oil-stained soil, and stressed vegetation were pronounced throughout the area immediately surrounding the burn pit.

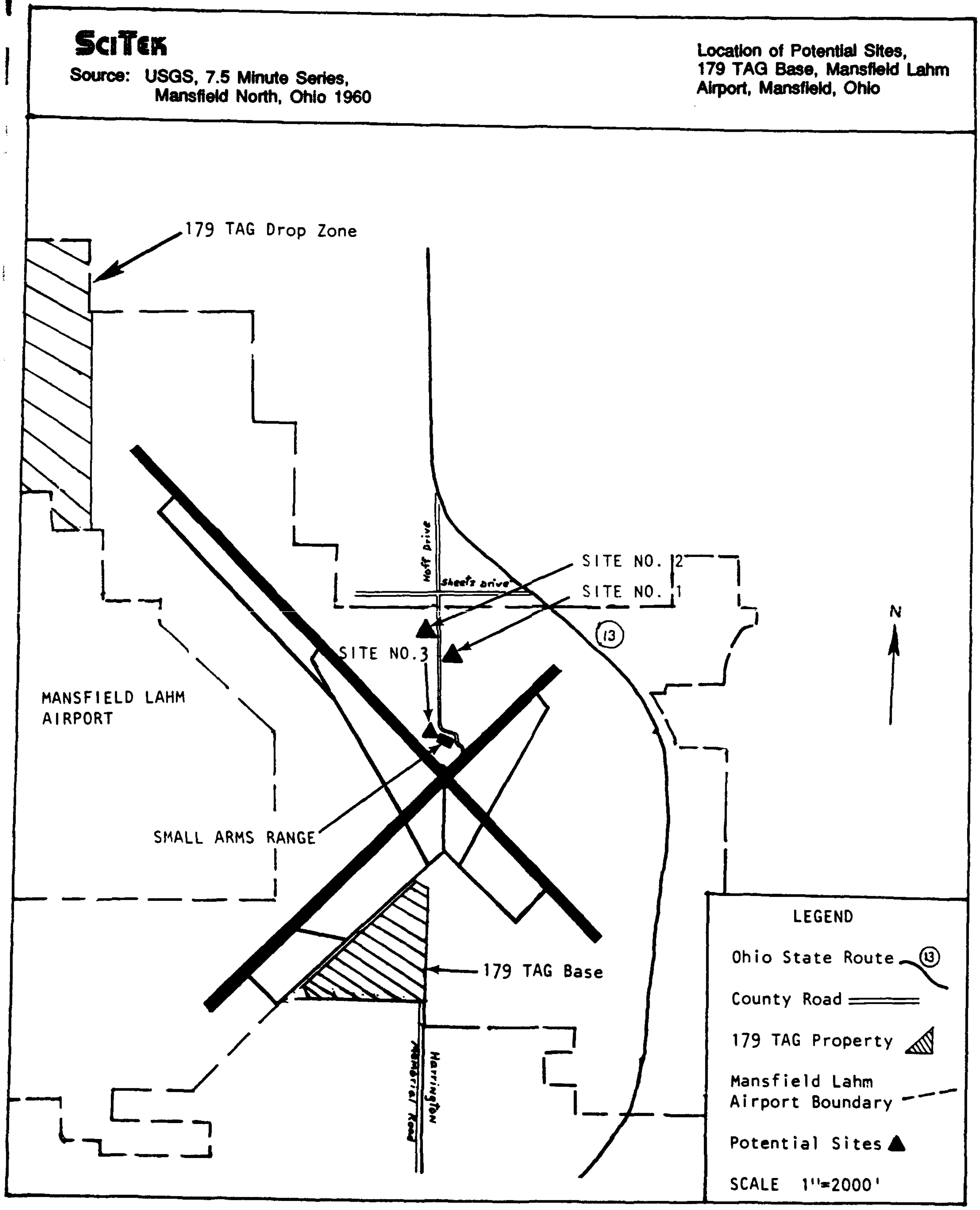

SciTek
Source: USGS, 7.5 Minute Series,
Mansfield North, Ohio 1960
Location of Potential Sites,
179 TAG Base, Mansfield Lahm
Airport, Mansfield, Ohio
179 TAG Drop Zone
Hoff Drive
Sheets Drive
SITE NO. 2
SITE NO. 1
SITE NO. 3
13
N
MANSFIELD LAHM
AIRPORT
SMALL ARMS RANGE
179 TAG Base
Harrington
Memorial Road
LEGEND
Ohio State Route
County Road
179 TAG Property
Mansfield Lahm
Airport Boundary
Potential Sites
SCALE 1''=2000'

Figure IV.1.

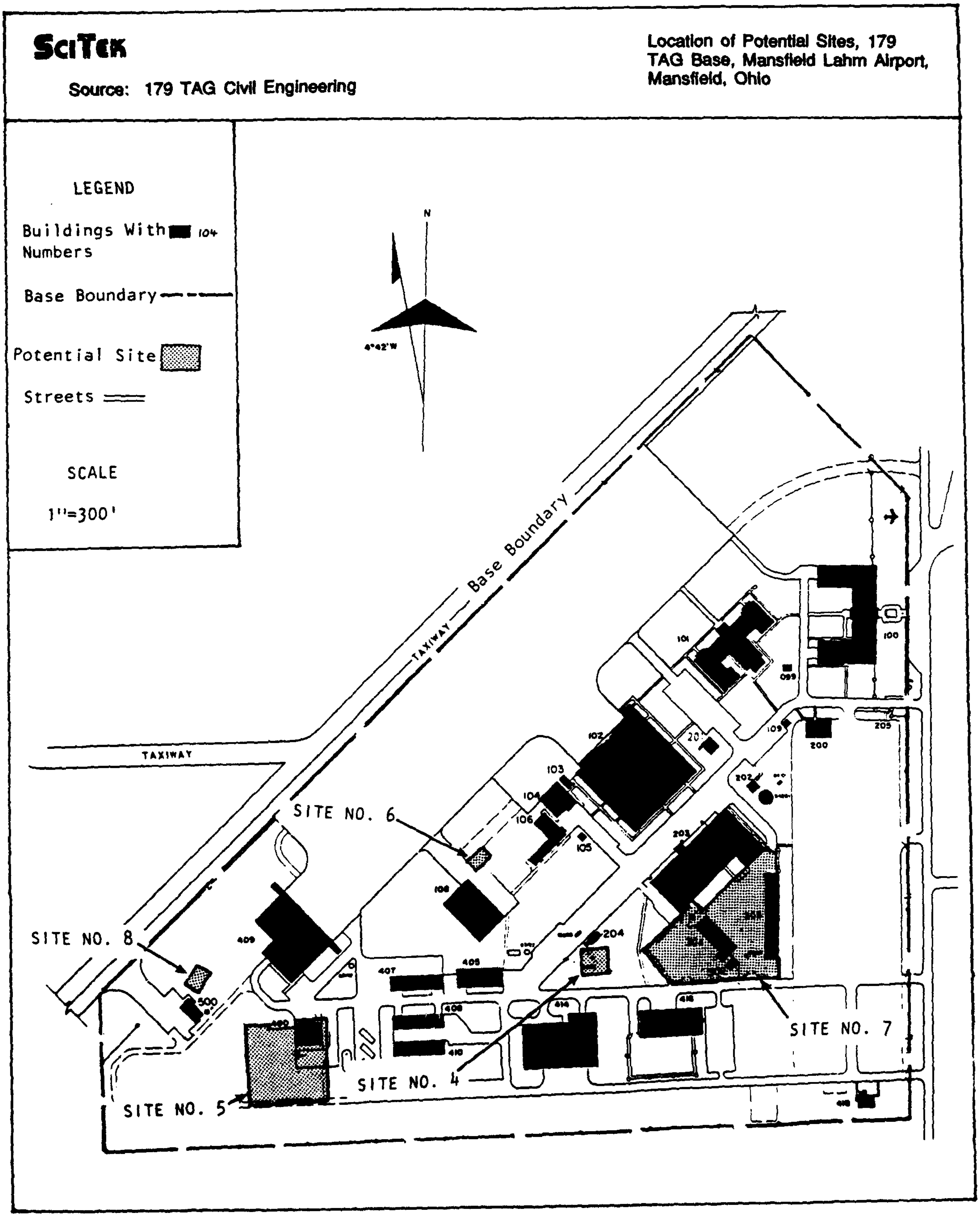

SciTek
Source: 179 TAG Civil Engineering
Location of Potential Sites, 179 TAG Base, Mansfield Lahm Airport, Mansfield, Ohio
LEGEND
Buildings With Numbers 104
Base Boundary
Potential Site
Streets
SCALE
1''=300'
N
TAXIWAY
Base Boundary
SITE NO. 6
SITE NO. 8
SITE NO. 7
SITE NO. 4
SITE NO. 5
100
101
102
103
104
105
106
108
109
200
201
202
203
204
205
405
407
408
409
410
414
416
500

Figure IV.2.

Base interviewees reported that Site No. 1 had been used for fire training exercises during the 1960s, 1970s, and 1980s. During each exercise, fuel was poured directly onto the water base and ignited. The burning fuel was then extinguished with an Aqueous Film-Forming Foaming (AFFF) agent.

Base interviewees reported that approximately 15 training fires were ignited each year during the 1960s and 1970s. One hundred and fifty gallons of mixed fuel were used for each burn. This fuel mixture consisted of JP-4 and large quantities of waste oils, cleaning solvents, and paint products from the Base's maintenance facilities.

During the late 1970s and early 1980s, 30 training fires were ignited each year. Three hundred gallons of mixed fuel were used for each fire. This fuel was predominately JP-4 with relatively small quantities of admixed liquid waste from the Base's maintenance facilities.

A Hazard Assessment Score (HAS) was assessed for Site No. 1 on the basis of its long period of use and the large volume of liquid waste that may have migrated from it into the soil and/or shallow groundwater. Using the best available information from the interviewees, it is estimated that as much as 100,000 gallons of mixed fuel could have been used at this site since the 1960s. If 70% of this fuel actually burned, the remaining 30%, possibly in excess of 30,000 gallons, may have migrated into underlying soil and/or shallow groundwater.

Site No. 2, Fire Training Area (FTA) 2 (HAS - 69)

Site No. 2 is a fire training area located on Mansfield Lahm Airport property, approximately 400 to 500 feet north-northwest of Site No. 1. Past fire training exercises at this site were conducted solely by the 179 TAG. The location of Site No.2 in relation to the Base and Mansfield Lahm Airport is illustrated in Figure IV.1.

Site No. 2 consisted of an old house foundation and the area adjacent to it. The exposed concrete foundation, which was approximately 20-feet square, was used as a burn pit. When fire training exercises were held, a fuel mixture was poured inside the foundation perimeter and ignited.

This foundation had been filled with soil and debris sometime after its use as a fire pit.

Consequently, the assessment team was unable to clearly determine the presence or absence of an impervious floor or liner.

No stressed vegetation or other evidence of contamination by fire training activities was visually apparent. However, some soil movement has occurred at this site since its last use. This may have been associated with the already mentioned filling of the foundation.

Base interviewees reported that Site No. 2 had been used as a fire training area for 4 to 5 years during the early to middle 1960s. It is assumed that fifteen pit fires, each involving 150 gallons of mixed fuel, were ignited during each year of use. The fuel mixture for each burn consisted of JP-4 and liquids such as waste oils, solvents, degreasers, and paint products from the Base's maintenance facilities.

This FTA was closed in the middle 1960s. After about 5 years of use, the foundation was no longer capable of holding the fuel mixture for an isolated, sustained burn.

A HAS was assessed for Site No. 2 because of its potential for contamination of soil and/or groundwater. Given a 5 year use period, it is estimated that as much as 11,000 gallons of mixed fuel may have been used at this site. If 70% of this fuel was burned in the training exercises, a 30% residuum, possibly in excess of 3300 gallons of liquid waste, may have migrated into the soil or shallow groundwater. Additional contaminant migration might have occurred because of the foundation's inability to retain liquids during its latter period of use.

Site No. 3, <u>Fire Training Area (FTA) 3 (HAS - 69)</u>

Site No. 3 is a past fire training area located on Mansfield Lahm Airport property adjacent to the Base's small arms firing range. Fire training exercises at this site were conducted solely by the 179 TAG. The location of Site No. 3 in relation to the Base and the small arms range is illustrated in Figure IV.1.

An on-site inspection of Site No. 3 revealed no evidence of a fire training area, and no evidence of stressed vegetation or contaminant migration was observed. Construction activities associated with building the small arms range may have covered or otherwise obliterated the fire training pit.

Training burns at this site were reportedly conducted in an excavated, circular pit, possibly measuring 50-60 feet in diameter. Without any kind of retaining liner, this pit was partially filled with water to form a water base. A mixture of JP-4 and liquid waste generated by the Base's maintenance facilities was then poured directly onto the water base and ignited.

Interviewees indicated that Site No. 3 was the first FTA used by the Base. Fire training exercises were apparently held there during the 1950s and early 1960s. A 1968 aerial reconnaissance photograph of the Base shows no sign of this FTA, thus indicating that it had been closed sometime prior to this date. Unfortunately, no earlier aerial photographs were available.

For an indeterminate amount of time, land at the Site No. 3 location was also used as a domestic trash disposal and temporary scrap metal storage site in the early 1960s. Domestic trash was disposed of by open burning. The scrap metal was disposed of by salvaging. Some liquid waste, including motor oil and cleaning solvents, may have been disposed of at this location.

The HAS was assessed for Site No.3 because a large volume of liquid hazardous waste has potentially contaminated the soil and groundwater. Unfortunately, Base personnel were uncertain about the frequency of training burns and the amount of mixed fuel used per burn at this site. Assuming at least 15 exercise burns per year, each using 150 gallons of mixed fuel, it is estimated that as much as 30,000 gallons of mixed fuel could have been used for fire training burns at this site since the early 1950s. If 70% of this fuel burned, the remaining 30% (9000 gallons) may have contaminated the soil and/or shallow groundwater. Additional liquid wastes deposited at the open dump may have contributed further to such contamination.

Site No. 4, POL Facility (HAS - 65)

Site No. 4 is the POL facility and its immediate vicinity. The location of the POL facility in relation to other Base facilities is illustrated in Figure IV.2.

There are confirmed reports that a JP-4 spill occurred at the POL facility during the mid 1960s, possibly in 1966. This spill happened one night while fuel was being pumped from one UST into another. JP-4 was observed flowing across the pavement, onto the street, and into a storm drain. An oil-like substance was later observed floating on the surface of Rocky Fork Creek within the city of Mansfield. Rocky Fork Creek flows through an area with several large industrial plants, and it is not known whether the substance was a result of the spill. Base interviewees estimated that the amount of JP-4 released may have been in excess of 1000 gallons.

Three additional JP-4 spills of 1000; 200; and 50 gallons were reported for 1970, 1976, and 1980, respectively. During each incident, fuel was being pumped from the POL tanks into tanker trucks, which were used to refuel aircraft. These tanker trucks overflowed as a result of a malfunctioning automatic shutoff valve. Base personnel used fresh water to wash a portion of JP-4 from the 1980 spill into a storm drain.

Site No. 4 was assessed a HAS because of the medium volume of JP-4 that has been released into the environment due to spills.

Site No. 5, <u>Building 400 Grounds (HAS - 62)</u>

Site No. 5 is the area southwest of Building 400. The location of this site in relation to Building 400 and the Base is illustrated in Figure IV.2. The contaminant at this site is waste PD-680 solvent.

From 1961 to 1968, waste PD-680 generated by the weapons maintenance facility may have been disposed of on the grounds at Building 400. PD-680 may also have been used for weed control along an old security fence southwest of Building 400. Based on interview information, it is estimated that volumes as high as 20 gallons per week were disposed of at Site No. 5 from 1961-1968. The maximum amount of PD-680 disposed of here is estimated to have been as much as 7000 gallons.

Site No. 5 was assessed a HAS because of PD-680's toxicity and by assuming a large volume (greater than 85 drums) of PD-680 was disposed of at this location. As a result, there could possibly be contaminated soil and/or shallow groundwater.

Site No. 6, Drum Holding Area (HAS - 59)

Site No. 6 is a drum holding area located outside Building 108 (Engine Shop) at the north corner. These drums contain liquid products necessary for the maintenance of aircraft engines. For many years, one barrel of engine oil, one barrel of solvent, and a waste oil bowser were kept at the site. In early 1988, four additional barrels of similar materials were added at this location. The location for Site No. 6 in relation to Building 108 and other Base facilities is illustrated in Figure IV.2.

The source of possible contamination at Site No. 6 is a past release of engine oil and possibly PD-680 solvent. Base interviewees reported that the contaminant release from the drums is a result of improperly sealed valves and spillage while pouring. While liquid products have been stored at Site No. 6 since 1963, the volume of contaminants released is assumed to have been small, perhaps less than 100 gallons.

An inspection of Site No. 6 revealed an area of heavily oil-stained soil approximately 15-feet long and 10-feet wide. Also, this area contained strong evidence of stressed vegetation.

Site No. 6 was assessed a HAS because small quantities of released contaminants might have contaminated the soil and/or shallow groundwater. The 25 year period of use increased the possibility for soil and groundwater contamination.

Site No. 7, Vehicle Maintenance: Building 304 (HAS - 54)

Site No. 7 is the currently paved parking area on the northeast side of Building 304 and the gravel parking area southwest of Building 304. The location of Site No. 7 in relation to Building 304 and the Base is illustrated in Figure IV.2.

The contaminants at site No. 7 are a variety of liquid wastes generated and disposed of by vehicle maintenance. Also, a leaking pipe to an UST may have contaminated Site No. 7.

In 1973, a vehicle wash rack with an oil/water separator and associated waste oil holding tank was installed at Building 304. The holding tank was used to store waste oil generated by Vehicle

Maintenance. Base interviewees reported that liquid waste generated by Vehicle Maintenance was disposed of at the FTA and small amounts were poured on the unpaved parking area outside of Building 304. Also, small volumes of liquid wastes may have been periodically poured on this site in the 1970s and 1980s. Some liquid wastes that may have been disposed of here are: engine oil, JP-4, hydraulic oil, varsol, PD-680 solvent, and brake fluid.

In 1975, a leak was discovered in the piping that connects the gas pump to the 1000 gallon MOGAS tank at Building 304. This leak was discovered when leaded gasoline floated to the ground surface during a period of heavy rainfall. Upon contact the gasoline deteriorated a 100-square feet section of asphalt in the parking area on the northeast side of the building.

Once discovered, the leaking pipe was immediately replaced with new pipe. The excavated trench was backfilled with uncontaminated soil, and the contaminated soil was transported off-site to an unknown location.

Assuming disposal of a small volume of liquid waste (less than 21 drums) at this site, a HAS was assessed.

Site No. 8, Drainage Swale Near Building 500 (HAS-54)

Site No. 8 is a drainage swale near Building 500. This collects rainwater drainage and water discharged from a storm water lift station at Building 500. Water from the engine test stand at Building 500 is collected and piped to an oil/water separator. The oil/water separator discharges into the lift station which discharges this water into the drainage swale. The location and areal extent of Site No. 8 in relation to Building 500 and other Base facilities is illustrated in Figure IV.2.

The source of possible contamination was overloading the oil/water separator which caused water possibly containing oil to go through the separator with insufficient time for the oil to separate from the water. This water and oil was discharged into the drainage swale. The water may have contained waste hydraulic oil, JP-4 jet fuel, and/or 7808 turbine oil.

During the early 1970s, a water injection system was used as a sound suppressor and heat dissipator while testing F-100 jet engines. The excess water used in this process and rainwater drainage went directly into the o/w separator at Building 500. This system used very large quantities of water and often caused overflows of the o/w separator.

Base interviewees reported seeing heavily oil-stained soil in the drainage swale directly adjacent to the o/w separator's waste oil holding tank. This area of oil-stained soil was approximately 6-feet wide by 50-feet long. Liquid waste was periodically observed in the drainage swale from 1972 to 1976. After the Base changed to airlift aircraft in 1976, the sound supressor was removed in 1977. Although the engine test stand is used for C-130 engines, no water is involved, and only rainwater from the pavement flows through the oil/water separator and lift station. Base interviewees estimated the quantity released to be in excess of 100 gallons. A site inspection during the initial site visit revealed no oil-stained soil, no stressed vegetation, and no additional evidence of contamination. Assuming the release of a small quantity (less than 21 drums) of liquid waste at this site, a HAS was assessed.

C. OTHER PERTINENT FACTS

- o A county landfill is located just west of the Base. This landfill operated from 1970 until closure in 1988.
- o The Base handles and uses certain ANG approved pesticides, herbicides, and fertilizers as needed. The Base has two entomologists who are licensed in Pest Management by the Department of Defense.
- o The o/w separator at Building 500 is connected to the storm sewer system. All other o/w separators are connected to the sanitary sewer system. The o/w separators are checked monthly and are pumped as needed. Figure E.2 shows the locations of o/w separators.
- o Samples of dielectric fluids from all on-base transformers have been analyzed. No PCB transformers were identified (See Appendix F).

- Trash and nonhazardous solid waste have been and are presently disposed of by an outside contractor.

- Sanitary sewage, along with industrial wastewater, is treated off-base at the Mansfield Wastewater Treatment Plant. Accordingly, the Base is not required to have a National Pollutant Discharge Elimination System (NPDES) permit.

- The Base Civil Engineer coordinates the Spill Response Program.

- The city of Mansfield Water Treatment Plant supplies water to the Base.

- At this time, no effluent or on-base surface water samples are collected.

V. CONCLUSIONS

Information obtained through interviews with Base personnel, reviews of records, and field observations were used to identify a total of eight potential hazardous materials/hazardous wastes disposal and/or spill sites on Base property.

The following eight potential sites exhibit the potential for contaminant migration through surface water and/or shallow groundwater:

Site No. 1 - Fire Training Area (FTA) 1
Site No. 2 - Fire Training Area (FTA) 2
Site No. 3 - Fire Training Area (FTA) 3
Site No. 4 - POL Facility
Site No. 5 - Building 400 Grounds
Site No. 6 - Drum Holding Area
Site No. 7 - Vehicle Maintenance: Building 304
Site No. 8 - Drainage Swale Near Building 500

VI. RECOMMENDATIONS

Initiation of further IRP investigation is recommended for the eight potential sites identified in the PA.

GLOSSARY OF TERMS

ALLEGHENY PLATEAU - A topographic plateau that covers parts of Richland County, Ohio and much of the north central Ohio. This topographic feature was resistant to the advance and erosion of Pleistocene glaciation, thus resulting in abrupt variations in glacial sediments.

AQUIFER - Stratum or zone below the surface of the earth capable of producing water as from a well. (DGT)*

BEDROCK - Any solid rock exposed at the surface of the earth or overlain by unconsolidated material. (DGT)*

CARBONIFEROUS - (286 million to 360 million years ago) The fifth of six periods of the Paleozoic of areas other than North America; also the system of rocks deposited during the period. (DGT)*

CLAY, MINERAL - A finely crystalline hydrous silicate of aluminum, iron, manganese, magnesium, and other metals belonging to the phyllosilicate group. The principal clay mineral groups are kaolinite, smectite (montmorillonite), illite, and vermiculite. (DGT)*

CLAY, PARTICLE SIZE - Particles, regardless of mineral content, with a diameter less than 1/256 mm. (4 microns). (DGT)*

CONTAMINANT - Includes, but is not limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformations in such organisms or their offsprings, except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress).

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the Administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act and shall not include natural gas of pipeline quality or mixtures of natural gas and such synthetic gas.

NOTE: Petroleum products are covered in other regulations. Wastes from petroleum products do not become RCRA hazardous wastes unless they fall under any of the USEPA guidelines for identifying Hazardous wastes:

(1) Listed hazardous wastes from certain specific and non-specific sources.

(2) Listed acutely hazardous wastes.

(3) Listed wastes that contain materials and products based on the criteria for toxicity.

(4) Wastes that meet any of four characteristics of hazardous waste - i.e. ignitability, reactivity, corrosivity, and extraction procedure toxicity (EP toxicity). (SARA)*

CONTAMINATION - The existence of biological, radiological, chemical, or other substances which have been identified as or may present a hazard to health or may render some portion of the environment unsuitable for use.

CRITICAL HABITAT - For a threatened or endangered species, the geographical area occupied by a species on which are found those physical or biological features that are essential to the conservation of the species and which may require special management considerations or protection. Also, specific areas outside the geographical area occupied by the species at the time it is listed (Section 4 of the Endangered Species Act), upon determination by the Secretary of the Interior that such areas are essential for the conservation of the species. (ESA)*

DOWNGRADIENT - The downslope flow of groundwater.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insect as determined by the Secretary of the Interior to constitute a pest whose protection under the Endangered Species Act would present an overwhelming and overriding risk to man. (ESA)*

EPOCH - A division of geologic time; when capitalized it becomes a formal division of geologic time corresponding to a series of rock and a subdivision of a period. (DGT)*

ESCARPMENT - A steep face terminating high lands abruptly. (DGT)*

FORMATION - The primary unit of formal mapping or description. Most formations possess certain distinctive or combinations of distinctive lithic features. Boundaries are not based on time criteria. Formations may be combined into groups or subdivided into members. (DGT)*

GLACIAL ADVANCE - Increase in the area and thickness of a glacier. (DGT)*

GLACIAL DRIFT - Sediment in transport in glaciers and deposited by glaciers. (DGT)*

GLACIAL LOBE - A tongue-like projection from the main mass of a continental glacier. (DGT)*

GLACIAL RETREAT - A glacier is said to retreat when its front recedes. The ice may be actually moving forward toward this front, but the rate of backward melting at the front, if it exceeds the rate of forward movement, will cause the position of the front to recede. (DGT)*

GLACIER - A mass of ice with definite lateral limits, with motion in a definite direction, and originating from the compacting of snow by pressure. (DGT)*

GROUNDWATER - That part of the subsurface water which is the zone of saturation. (DGT)*

HAZARD ASSESSMENT RATING METHODOLOGY (HARM) - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health and environmental impacts. (DEQPPM)*

HAZARD ASSESSMENT SCORE (HAS)- The score yielded by using the Hazard Assessment Rating Methodology.

HAZARDOUS WASTE - A solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may -

(a) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or

(b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. (RCRA)*

ILLINOIAN - The third of four classical glaciations during the Pleistocene Epoch of North America. This glaciation occurred approximately 200,000 to 130,000 years ago. (WM) (F)*

INSTALLATION RESTORATION PROGRAM (IRP) - The DoD program for identifying the location of and releases of hazardous materials from past disposal sites and minimizing their associated hazards to public health.

INTERBEDDED - Occurring between beds or lying in a bed parallel to other beds of a different material; interstratified. (DGT)*

LITHOLOGY - The physical character of a rock, generally as determined megascopically or with the aid of a low-power magnifier. (DGT)*

LOAM - A soil composed of a mixture of clay, silt, and organic matter. (DGT)*

LOW PLATEAU - A topographic plateau with an areal distribution encompassing portions of Richland and adjoining counties in northeastern Ohio. This plateau is classified as part of the regional Allegheny Plateau Physiographic Province.

MIGRATION - Contaminant movement through pathways such as soil, air, surface water, and groundwater.

MISSISSIPPIAN - (320 million to 360 million years ago) The fifth of seven periods into which the Paleozoic is divided in the United States and some other parts of North America. Approximately equivalent to the Lower Carboniferous of the rest of the world. Also, the system of rocks formed during that period. (DGT)*

MORAINE - Drift deposited chiefly by direct glacial action and having constructional topography independent of control by the surface on which the drift lies. (DGT)*

NATURAL AREA - Designated areas with critical habitat or endangered species protected from human exploitation by federal or state laws.

NET PRECIPITATION - Total precipitation minus evaporation. (FR)*

OVERBURDEN - Material of any nature, consolidated or unconsolidated, that overlies a deposit. (DGT)*

PENNSYLVANIAN - (286 million to 320 million years ago) In the United States, the sixth of seven periods of the Paleozoic. Equivalent, approximately, to the Upper Carboniferous outside of the United States. Also the system of rocks deposited during that period. (DGT)*

PERMEABILITY - Capacity of a rock, soil, or unconsolidated sediment to transmit a fluid over a given period of time.

PHYSIOGRAPHIC PROVINCE - A region of similar structure and climate that has had a unified geomorphic history. (DGT)*

PLEISTOCENE - (0.01 million to 2 million years ago) The earlier of the two epochs comprising the Quaternary Period. Also the Post-Pliocene (post-Tertiary) glacial age, which in the above terminology implies the glacial age is over. Also the series of sediments deposited during this epoch. (DGT)*

RUNOFF - Something that runs off, as rain in excess of the amount absorbed by the ground. (W)*

SANDSTONE - A cemented or otherwise compacted detrital sediment composed predominantly of quartz grains, the grades of the latter being those of sand. (DGT)*

SEDIMENTARY - Descriptive term for rock formed of sediment, especially: (1) Clastic rocks, as conglomerate, sandstone, and shales, formed of fragments of other rock transported from their sources and deposited in water. (2) Rocks formed by precipitation from solution, as rock salt and gypsum, or from secretions of organisms, as most limestone. (DGT)*

SHALE - A laminated sediment in which the constituent particles are predominantly of the clay grade. Shale includes the indurated, laminated, or fissile claystones and siltstones. The cleavage is that of bedding and such other secondary cleavage or fissility that is approximately parallel to bedding. The secondary cleavage has been produced by the pressure of overlying sediments and plastic flow. (DGT)*

SILTSTONE - A very fine-grained consolidated clastic rock composed predominantly of particles of silt grade. (DGT)*

STRATIGRAPHY - The arrangement of rocks in layers or strata.

SURFACE WATER - Water exposed on ground surface, i.e., lakes, streams, rivers, etc.

SWALE - A slight, marshy depression in generally level land. (DGT)*

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. (ESA)*

TOXICITY - A relative property of a chemical agent and refers to a harmful effect on some biologic mechanism and the condition under which this effect occurs.

UPGRADIENT - A hydraulically upslope direction.

WATER TABLE - The surface on which the fluid pressure in the pores of a porous medium is exactly atmospheric. The location of this surface is revealed by the level at which water stands in a shallow opening along its length and penetrating the surficial deposits just deeply enough to encounter standing water in the bottom. (FC)*

WETLANDS - Land or areas (as tidal flats or swamps) containing much soil moisture. (W)*

WILDERNESS AREAS - Large tracts of public land maintained essentially in its natural state and protected against introduction of intrusive artifacts (as roads and buildings). (W)*

WISCONSIN - The last of four classical glacial stages during the Pleistocene Epoch of North America. This glaciation occurred approximately 75,000 to 10,000 years ago. (DGT) (F)*

* Source Codes:

DEQPPM	-	Defense Environmental Quality Program Policy Memorandum, 1980.
DGT	-	Dictionary of Geological Terms, 1976.
ESA	-	Endangered Species Act, 1973.
F	-	Fagan, 1975.
FC	-	Freeze and Cherry, 1979.
FR	-	Federal Register (July 16) 1982: 31224.
RCRA	-	Resource Conservation and Recovery Act, 1976.
SARA	-	Superfund Amendments and Reauthorization Act, 1986.
W	-	Webster's Ninth Collegiate Dictionary, 1985.
WM	-	Wicander and Monroe, 1989.

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Appendix A

Resumes of Search Team Members

TRACY CHARLES BROWN
Research Associate

QUALIFICATIONS

Environmental Compliance, Regulatory Analysis, Environmental Investigation/Remediation, and Assessment/Mitigation of Adverse Environmental Impacts

Under the U.S. Department of Defense, Installation Restoration Program (IRP) and the U.S. Department of Energy, Hazardous Waste Remedial Actions Program (DOE-HAZWRAP) [Martin Marietta Energy Systems, Inc.], participated in a Preliminary Assessment (PA) aimed at identifying hazardous waste disposal sites at the Oklahoma Air National Guard Base at Will Rogers World Airport in Oklahoma City, Oklahoma.

Substantially revised and amended the Spill Prevention, Control, and Countermeasures (SPCC) Plan for the Y-12 nuclear weapons plant (U.S. Department of Energy/Martin Marietta Energy Systems, Inc.). Led the research, regulatory analysis and compliance, planning, organizational, and writing aspects of the project and coordinated these with the concurrent engineering inspection and certification activities of a subcontractor.

Performed a variety of environmental impact assessment and mitigation activities focusing on cultural and historic resources.

Research and Information Skills

Demonstrated strong scientific investigation, research, and development skills on federally funded projects. Adept at collecting information and data through field observations, surveys, and library resources; keeping detailed, three-dimensional records; compiling data; and focusing on details. Proficient at research design; foreseeing and solving research-related problems; comparing, analyzing, and synthesizing information; and attaining objectives.

Communications and Advising Skills

Experienced writer/editor. Authored a combined total of nearly thirty environmental documents, training manuals, scientific reports, and journal articles. Expert at advising, gathering information through interviews, and consulting with specialists.

Knowledge Areas

Familiar with federal regulations under the Clean Water Act, the Resource Conservation and Recovery Act (RCRA), and the Toxic Substances Control Act (TSCA). Geology (thirty-two course hours including Environmental Geology and Geomorphology), general biology, human skeletal biology, and archaeology/anthropology (environmental impact assessments; cultural resource management; field surveying, sampling, and excavation strategies; mapping; using topographic maps, USDA Soil surveys, and aerial photographs).

EDUCATION

M.A., University of Tennessee, Knoxville, 1982.

B.A., University of Tennessee, Knoxville, 1976 (with Highest Honors).

Austin Peay State University, 1971-1973.

PUBLICATIONS AND PROFESSIONAL PAPERS

Complete list available upon request.

REFERENCES

Available upon request.

JACK DENTON WHEAT
Geologist/Hydrogeologist

EDUCATION

B.S. Geology - Tennessee Technological University

Seminar - Types of radioactive nuclides and the transmitters of radioactive contaminants.

Seminar - RCRA/CERCLA treatment alternatives for hazardous waste.

EXPERIENCE

Geologist/Hydrogeologist, Science & Technology, Inc., 1988 - Present

Performed Preliminary Assessments (PA) for the Department of Defense Installation Restoration Program (IRP). Reviewed and evaluated the geology and hydrogeology of Air National Guard bases to determine the susceptibility of principal groundwater aquifers to contamination from surface pollutants. Analyzed RCRA regulations to determine their relationship to the Department of Defense Hazard Assessment Rating Methodology (HARM). Prepared maps and major sections of text for the final PA reports.

Assisted with revising the Spill Prevention, Control, and Countermeasures (SPCC) Plan for the Y-12 nuclear weapons plant in Oak Ridge, Tennessee.

Geological Assistant, Robert Stansfield Consulting Geologist, 1987

Installed monitoring wells at EPA Superfund sites and private company facilities. Followed OSHA health and safety standards and EPA standards for postdrilling decontamination of site equipment during monitoring well construction.

Field Hydrogeologist, Oak Ridge National Laboratory (ORNL), February 1987 - May 1987

Logged soil cuttings in the field and collected soil samples at specified intervals for soil borings at SWSA 6 and along the proposed DOE - Bethel Valley LLW pipeline route. Installed monitoring wells at SWSA 6 and selected LLW borings to evaluate potential ground water contamination. Supervised on-site drilling procedures and personnel safety requirements. Compiled individual LLW boring reports, which included soil sample descriptions, zones of groundwater saturation, and monitoring well schematic logs. For the ORNL Environmental Sciences Division, developed a work plan evaluating the groundwater conduction potential of pipe trench back fill.

Consulting Petroleum Geologist, 1980 - 1986

Logged samples of well cuttings collected during exploration drilling of oil and natural gas wells. Supervised on-site drilling procedures that included the cementing of surface casing to prevent the contamination of groundwater aquifers, and the construction of lined retaining pits as a remediation measure for potential oil spills and/or to prevent the release of drilling fluids into the environment. Compiled exploration drillsite reports that included sample descriptions, descriptions of penetrated oil or gas payzones and the potential of these payzones to produce commercial oil or natural gas. Compiled geologic reports for selected areas. These reports covered general geology, formation stratigraphy, potential payzones for oil or natural gas, and geologic maps including structure contours and isopachs. Drafted maps showing previously drilled or permitted locations. Analyzed geophysical logs to evaluate oil and natural gas payzones.

Geologist, Petroleum Development Corporation, 1977 - 1980

Logged samples of well cuttings collected during exploration drilling of oil and natural gas wells. Supervised installation and cementing of surface casing. Prepared geologic maps to select areas for oil and natural gas exploration. Drafted maps showing previously drilled or permitted locations. Analyzed geophysical logs to evaluate oil and natural gas payzones.

GEOLOGICAL REGISTRATION

Licensed professional geologist, State Of North Carolina.

RAY S. CLARK
Civil/Environmental Engineer

EDUCATION

Graduate Courses (Environmental Engineering), The University of Tennessee , Knoxville, Tennessee.

B. S. Degree (Civil Engineering/Environmental Engineering Emphasis), The University of Tennessee, Knoxville, Tennessee.

RCRA/CERCLA Seminar - Treatment Alternatives for Hazardous Waste.

EXPERIENCE

Civil/Environmental Engineer, Science & Technology, Inc., Oak Ridge, Tennessee, 1988 - Present.

Working under the U.S. Department of Defense, Installation Restoration Program (IRP) and the U.S. Department of Energy, Hazardous Waste Remedial Actions Program (HAZWRAP) [Martin Marietta Energy Systems, Inc.], participated in Preliminary Assessment (PA) record searches aimed at identifying hazardous waste disposal sites on Air National Guard Bases. Reviewed base civil engineering, environmental, and historical documents relevant to hazardous waste generation, storage, treatment, and disposal; PCB - contaminated items; environmental incidents; and the chemical eradication of pests. Surveyed and inventoried data on underground storage tanks and oil/water separators. Examined aerial photographs, performed field surveys, and participated in interviews with base personnel as part of a comprehensive effort to assess past, on-base hazardous waste disposal practices and to identify/document potential past hazardous waste disposal sites. Contacted local, state, and federal agencies to obtain additional data pertinent to using the United States Air Force's Hazard Assessment Rating Methodology (HARM). Rated potential hazardous waste disposal sites using the HARM. Coauthored the PA reports.

Assisted with revising the Spill Prevention, Control, and Countermeasures (SPCC) Plan for the Y-12 nuclear weapon plant (Oak Ridge), one of the nation's largest and most physically complex defense research and development facilities.

Technician, Clark Drilling Services, Knoxville, Tennessee, 1980-1988.

Installed and developed hazardous waste monitoring wells. Conducted on-site inspections of monitoring wells.

PROFESSIONAL ORGANIZATIONS

American Society of Civil Engineers

Appendix B

Outside Agency

Contact List

OUTSIDE AGENCY CONTACT LIST

Ohio Department of Natural Resources
Division of Natural Areas and Preserves
Fountain Square, Building E
Columbus, Ohio 43224
(614) 265-6453

Ohio Department of Natural Resources
Division of Water, Groundwater Resources Section
Fountain Square, Building E-3
Columbus, Ohio 43224
(614) 265-6744

U. S. Soil Conservation Service
AG Center
1512 Ashland Road
Mansfield, Ohio 44905
(419) 589-2712

Ohio Department of Natural Resources
Division of Geological Survey
Fountain Square, Building B
Columbus, Ohio 43224
(614) 265-6605

Richland County Regional Planning Commission
35 North Park Street
Mansfield, Ohio 44902
(419) 755-5684

Appendix C

USAF Hazard Assessment

Rating Methodology

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has developed a comprehensive program to identify, evaluate, and control hazardous waste disposal practices associated with past waste disposal techniques at DoD facilities. One of the actions required under this program is to:

> Develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the U.S. Air Force has sought to establish a system to set priorities for taking further action at sites based upon information gathered during the Preliminary Assessment phase of the Installation Restoration Program.

PURPOSE

The purpose of the site rating model is to assign a ranking to each site where there is suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-up site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazard waste present in sufficient quantity), and (2) potential for migration exists. A site may be deleted from ranking consideration on either basis.

DESCRIPTION OF THE MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD needs.

The model uses data readily obtained during the Preliminary Assessment portion of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors presented in Appendix D of this document. The site rating form and the rating factor guidelines are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: (1) possible receptors of the contamination, (2) the waste and its characteristics, (3) the potential pathways for contaminant migration, and (4) any effort that was made to contain the waste resulting from a spill.

The receptors category rating is based on four rating factors: (1) the potential for human exposure to the site, (2) the potential for human ingestion of contaminants should underlying aquifers be polluted, (3) the current and anticipated use of the surrounding area, and (4) the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1000 feet of the site, and the distance between the site and the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 X factor subtotal/maximum score subtotal).

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score while scores for solids are reduced.

The pathways category rating is based on evidence of contaminant migration along one of three pathways: surface water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment are not reduced. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well-managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the score for the other three categories.

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE ______________________

LOCATION ______________________

DATE OF OPERATION OR OCCURRENCE ______________________

OWNER/OPERATOR ______________________

COMMENTS/DESCRIPTION ______________________

SITE RATED BY ______________________

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to installation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Groundwater use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by groundwater supply within 3 miles of site		6		
		Subtotals	______	______

Receptors subscore (100 x factor score subtotal/maximum score subtotal) ______

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) ______
2. Confidence level (C = confirmed, S = suspected) ______
3. Hazard rating (H = high, M = medium, L = low) ______

Factor Subscore A (from 20 to 100 based on factor score matrix) ______

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

______ x ______ = ______

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

______ x ______ = ______

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		

Subtotals ______ ______

Subscore (100 x factor score subtotal/maximum score subtotal) ______

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding		1		

Subscore (100 x factor score/3) ______

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to groundwater		8		

Subtotals ______ ______

Subscore (100 x factor score subtotal/maximum score subtotal) ______

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors ______
Waste Characteristics ______
Pathways ______

Total ______ divided by 3 = ______
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

______ x ______ = ______

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land use/zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Groundwater use of uppermost aquifer	Not used, other sources readily available	Commercial industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available, commercial, industrial, or irrigation; no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-15	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- Verbal reports from interviewer (at least 2) or written information from the records
- Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- No verbal reports or conflicting verbal reports and no written information from the records
- Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels: 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability, and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	H
	M	C	H
70	L	S	H
60	S	C	H
	M	C	H
50	L	S	H
	L	C	L
	M	S	H
	S	C	H
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	H
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating

- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical state	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

III. **PATHWAYS CATEGORY**

A. **Evidence of Contamination**

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, groundwater, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 **Potential for Surface Water Contamination**

Rating Factors	0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to a mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($>10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year, 24 hour rainfall (thunderstorms)	<1.0 inch 0-5 0	1.0 to 2.0 inches 6-35 30	2.1 to 3.0 inches 36-49 60	>3.0 inches >50 100	8

B-2 **Potential for Flooding**

Rating Factors	0	1	2	3	Multiplier
Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 **Potential for Groundwater Contamination**

Rating Factors	0	1	2	3	Multiplier
Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay 10^{-2} to 10^{-4} cm/sec	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high groundwater level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean groundwater level	8
Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- Clay cap or other impermeable cover
- Leachate collection system
- Liners in good condition
- Adequate monitoring wells

Spills:

- Quick spill cleanup action taken
- Contaminated soil removed
- Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- Liners in good condition
- Sound dikes and adequate freeboard
- Adequate monitoring wells

Fire Protection Training Areas:

- Concrete surface and berms
- Oil/water separator for pretreatment of runoff
- Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-B-3, then leave blank for calculation of factor score and maximum possible score.

Appendix D

Site Hazard Assessment Rating Forms and Factor Rating Criteria

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Fire Training Area (FTA) 1 - Site No. 1

LOCATION Approximately 2500 feet North of Base Boundary on Airport Property

DATE OF OPERATION OR OCCURRENCE 1960 - 1980's

OWNER/OPERATOR 179 Tactical Airlift Group, Mansfield, Ohio

COMMENTS/DESCRIPTION Area used for Fire Training Exercises

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	[illegible]	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18

Subtotals 66 180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 37

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.9 = 90

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

90 x 1.0 = 90

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
Subtotals			68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
Subtotals			62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	37
Waste Characteristics	90
Pathways	80

Total 207 divided by 3 = 69 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

69 x 1.0 = $\boxed{69}$

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Fire Training Area (FTA) 2 - Site No. 2

LOCATION On Airport Property Approximately 400 - 500 Feet NNW of Site No. 1

DATE OF OPERATION OR OCCURRENCE Early to Middle Sixties: Approximately 4 - 5 Years

OWNER/OPERATOR 179 Tactical Airlift Group, Mansfield, Ohio

COMMENTS/DESCRIPTION Area Used For Fire Training Exercises

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
Subtotals			66	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 37

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.9 = 90

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

90 x 1.0 = 90

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	2	8	16	24
Net precipitation	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
Subtotals			60	108

Subscore (100 x factor score subtotal/maximum score subtotal) 56

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
Subtotals			62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	37
Waste Characteristics	90
Pathways	80
Total 207 divided by 3 =	69 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

69 x 1.0 = 69

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Fire Training Area (FTA) 3 - Site No. 3

LOCATION On Airport Property Adjacent to Small Arms Firing Range

DATE OF OPERATION OR OCCURRENCE 1950's and Early 1960's

OWNER/OPERATOR 179 Tactical Airlift Group, Mansfield, Ohio

COMMENTS/DESCRIPTION Area Used For Fire Training Exercises

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	0	4	0	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
		Subtotals	66	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 37

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 100

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

100 x 0.9 = 90

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

90 x 1.0 = 90

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore f 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
Subtotals			68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
Subtotals			62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 37
Waste Characteristics 90
Pathways 80
Total 207 divided by 3 = 69
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

69 x 1.0 = 69

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE POL Facility - Site No. 4

LOCATION POL Area Outside Building 204

DATE OF OPERATION OR OCCURRENCE Mid 1960's. 1970, 1976, 1980

OWNER/OPERATOR 179 Tactical Airlift Group, Mansfield, Ohio

COMMENTS/DESCRIPTION

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18

Subtotals 78 180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 43

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

80 x 0.9 = 72

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

72 x 1.0 = 72

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
Subtotals			68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	2	8	16	24
Direct access to groundwater	1	8	8	24
Subtotals			70	114

Subscore (100 x factor score subtotal/maximum score subtotal) 61

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	43
Waste Characteristics	72
Pathways	80

Total 195 divided by 3 = 65 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

65 x 1.0 = 65

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Building 400 Grounds - Site No. 5

LOCATION SW of Building 400

DATE OF OPERATION OR OCCURRENCE 1961 - 1968

OWNER/OPERATOR 179 Tactical Airlift Group, Mansfield, Ohio

COMMENTS/DESCRIPTION PD-680 Disposed of on Grounds

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
Subtotals			78	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 43

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 70

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

70 x 0.9 = 63

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

63 x 1.0 = 63

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
Subtotals			68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
Subtotals			62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors 43
Waste Characteristics 63
Pathways 80

Total 186 divided by 3 = 62
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

62 x 1.0 = $\boxed{62}$

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Drum Holding Area - Site No. 6

LOCATION Outside North Corner of Building 108

DATE OF OPERATION OR OCCURRENCE 1960's - 1988

OWNER/OPERATOR 179 Tactical Airlift Group, Mansfield, Ohio

COMMENTS/DESCRIPTION Area used to hold drums containing liquid product

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
Subtotals			78	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 43

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 0.9 = 54

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

54 x 1.0 = 54

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
		Subtotals	68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
		Subtotals	62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	43
Waste Characteristics	54
Pathways	80

Total 177 divided by 3 = 59
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

59 x 1.0 = 59

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Vehicle Maintenance: Building 304 - Site No. 7

LOCATION Two Parking Areas located NE and SW of Building 304

DATE OF OPERATION OR OCCURRENCE Prior to 1973, 1975

OWNER/OPERATOR 179 Tactical Airlift Group, Mansfield, Ohio

COMMENTS/DESCRIPTION

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
Subtotals			78	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 43

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

50 x 0.8 = 40

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
		Subtotals	68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
		Subtotals	62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	43
Waste Characteristics	40
Pathways	80

Total 163 divided by 3 = 54 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

54 x 1.0 = 54

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE Drainage Swale Near Building 500 - Site No. 8

LOCATION North Corner Outside Building 500

DATE OF OPERATION OR OCCURRENCE Early 1970's

OWNER/OPERATOR 179 Tactical Airlift Group, Mansfield, Ohio

COMMENTS/DESCRIPTION

SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	2	6	12	18
Subtotals			78	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 43

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) M

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

50 x 0.8 = 40

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
Subtotals			68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
Subtotals			62	114

Subscore (100 x factor score subtotal/maximum score subtotal) 54

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	43
Waste Characteristics	40
Pathways	80

Total 163 divided by 3 = 54 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

54 x 1.0 = 54

179 Tactical Airlift Group

Ohio Air National Guard

Mansfield Lahm Airport

Mansfield, Ohio

USAF Hazard Assessment Rating Methodology Rating Factor Criteria

The following is an explanation of the HARM factor rating criteria for each of the eight proposed sites at the Base:

I. **Receptors**

Site Nos. 1 - 3

A. **Population Within 1,000 Feet of Site**. Factor Rating 0. All three FTA's are at off-base locations north of the Base and in the same general area. The space within a 1,000 foot radius of each site is unpopulated.

B. **Distance to Nearest Well**. Factor Rating 3. Well records indicate a water well within 3,000 feet of each site.

C. **Land Use/Zoning** (within one mile radius). Factor Rating 2. Local authorities have zoned the area encompassing these sites as Transportation and Utilities. This designation would correspond with the Commercial or Industrial category in the HARM.

D. **Distance to Installation Boundary**. Factor Rating 3. Site No. 1 is located approximately 3,750 feet outside the Base boundary. Site No. 2 is about 3,350 feet outside the boundary, and Site No. 3 is approximately 2,500 feet outside the Base boundary.

E. **Critical Environments** (within one mile radius of site). Factor Rating 0). The Ohio Department of Natural Resources; Division of Natural Areas and Preserves has identified no critical environments within a one mile radius of each site.

F. **Water Quality/Use Designation of Nearest Surface Water body**. Factor Rating 0. Brubaker Creek is the nearest body of surface Water. This tributary of the Mohican River is a primary drainage artery for adjacent farmland.

G. **Groundwater Use of Uppermost Aquifer**. Factor Rating 0. Local water use is dependent upon deep aquifers and nearby reservoirs.

H. **Population Served by Surface Water Supplies 3 Miles Downstream of Site**. Factor Rating 0. The surface water supplies within 3 miles downstream in Brubaker Creek is not used as a drinking water source.

I. **Population Served by Aquifer Within 3 Miles of Site**. Factor Rating 2. Approximately 50 potable water wells have been identified within a 3 mile radius of the FTA's.

Site Nos. 4 - 8

A. **Population Within 1000 Feet of Site**. Factor Rating 3. The Base has approximately 220 full time personnel through the week. The Base population is approximately 950 on Unit Training Assembly (UTA) weekends.

B. **Distance to Nearest Well**. Factor Rating 3. An on-Base waterwell is located at Building 202. The distances from this well to Site Nos. 4 - 8 are approximately as follows:

Site 4	500 feet
Site 5	1,100 feet
Site 6	700 feet
Site 7	200 feet
Site 8	1,500 feet

C. **Land Use/Zoning** (within one mile radius). Factor Rating 2. The Richland County Planning Commission has zoned the area within one mile of each site for Transportation and Utilities use. This zoning corresponds with the Commercial or Industrial zoning in the HARM.

D. **Distance to Installation Boundary**. Factor Rating 3. All of these sites are located less than 500 feet from the installation boundary.

E. **Critical Environments** (within one mile radius of site). Factor Rating 0. The Ohio Department of Natural Resources, Division of Natural Areas and Preserves had identified no critical environments within a one mile radius of each site.

F. **Water Quality/Use Designation of Nearest Surface Water body**. Factor Rating 0. Rocky Fork Creek and a nearby pond are the closest bodies of surface water to these sites. The creek, a tributary of the Mohican River, flows through a primary industrial area.

G. **Groundwater Use of Uppermost Aquifer**. Factor Rating 0. Local water use is dependent upon deep aquifers and nearby reservoirs.

H. **Population Served by Surface Water Supplies 3 Miles Downstream of Site**. Factor Rating 0. Within 3 miles downstream of these sites, Rocky Fork Creek is not used as a drinking water source.

I. **Population Served by Aquifer Within 3 Miles of Site**. Factor Rating 2. Approximately 50 potable water wells have been identified within a 3 mile radius of each site.

II. **Waste Characteristics**

Site No. 1

A - 1: Waste Quantity - Factor Rating L (Large). With the extended period of use (25 - 30 years) and the frequency of burns, it is possible that a large (>85 drums) quantity of liquid waste may have migrated into the soil and shallow groundwater.

A - 2: Confidence Level - Factor Rating C (Confirmed). Base interviewees indicated this site as a past FTA. Also, an inspection indicated oil-stained soil, stressed vegetation, and a metal structure used to simulate a burning aircraft.

A - 3: Hazard Rating - Factor Rating H (High). Site No. 1 was used for disposal of JP-4 and Base-Generated liquid wastes. Consequently, it was assigned a hazard rating of H (High) because the SAX toxicity for JP-4 is 3.

Site No. 2

A - 1: Waste Quantity - Factor Rating L (Large). With this site being used approximately 4 - 5 years and the frequency of burns, it is possible that 85 drums of liquid waste have migrated into the soil or shallow groundwater.

A - 2: Confidence Level - Factor Rating C (Confirmed). Base interviewees reported this site as a past FTA.

A - 3: Hazard Rating - Factor Rating H (High). With JP-4 having a SAX toxicity of 3, this site was given a high hazard rating.

Site No.3

A - 1: Waste Quantity - Factor Rating L (Large). With the extended period of use (10 - 15 years) and frequency of burns, it is possible that 85 drums of liquid wastes have migrated into the soil or shallow groundwater.

A - 2: Confidence Level - Factor Rating C (Confirmed). Base interviewees identified this site as a past FTA and possible open dump for domestic trash.

A - 3: Hazard Rating - Factor Rating H (High). JP-4 has a SAX toxicity of 3. Accordingly, this site was given a high hazard rating.

Site No. 4

A - 1: Waste Quanity - Factor Rating M (Medium). Several JP-4 spills, possibly totaling 2250 gallons or more, have occurred in the POL area.

A - 2: Confidence Level - Factor Rating Level C (Confirmed). Several interviewees recalled the occurrence of significant JP-4 spills at the POL facility.

A - 3: Hazard Rating - Factor Rating H (High). JP-4 has a high SAX toxicity rating (3).

Site No. 5

A - 1: Waste Quantity - Factor Rating L (Large). An interviewee reported disposal of a large quantity of PD-680 solvent within the old fence perimeter of Building 400.

A - 2: Confidence Level - Factor Rating S (Suspected). This rating was based on a report from an interviewee.

A - 3: Hazard Rating - Factor Rating H (High). PD-680 solvent has a SAX toxicity of 3.

Site No. 6

A - 1: Waste Quantity - Factor Rating S (Small). Small amounts of hazardous materials, including PD-680, were spilled from drums while filling small containers.

A - 2: Confidence Level - Factor Rating C (Confirmed). This spill was confirmed by observation of oil-stained soil and stressed vegetation.

A - 3: Hazard Rating - Factor Rating H (High). PD-680 has a SAX toxicity rating of 3.

Site No. 7

A - 1: Waste Quantity - Factor Rating S (Small). The precise amount of waste released at this site is unknown and therefore a small quantity was assumed for HAS calculations.

A - 2: Confidence Level - Factor Rating C (Confirmed). Numerous interviewees reported dumping of waste oil at this site.

A - 3: Hazard Rating - Factor Rating M (Medium). Waste oil has a SAX toxicity of 2, which corresponds to a medium Hazard Rating.

Site No. 8

A - 1: Waste Quantity - Factor Rating S (Small). Interviewees reported several small overflows, up to 100 gallons/release, of the o/w separator holding tank at Building 500.

A - 2: Confidence Level - Factor Rating C (Confirmed). Several interviewees reported overflows of the o/w separator (waste-oil holding tank) between 1972 and 1976.

A - 3: Hazard Rating - Factor Rating M (Medium). Waste oil has a SAX toxicity of 2, which corresponds to a medium Hazard Rating.

B. Persistence Multiplier for Point Rating

Site Nos. 1, 2, 3, 4, 5, and 6 were assigned a persistence multiplier of 0.9 based on JP-4 and PD-680, which are assigned the HARM category of "Substituted and Other Ring Compounds."

A persistence multiplier of 0.8 was assigned to Sites 7 and 8 because waste oils are classified under the HARM category of "Straight Chain Hydrocarbons."

C. Physical State Multiplier

All sites were assigned a physical state multiplier of 1.0 because the waste substances released were liquids.

III. Pathways Category

A. Evidence of Contamination

Site No. 1: Indirect evidence (Factor Rating 80). Stressed vegetation, barren areas, and a strong petroleum odor were detected at this FTA.

Site No. 2: Indirect evidence (Factor Rating 80). On the basis of interviewee reports, this former FTA is greatly suspected of being a source of contamination.

Site No. 3: Indirect evidence (Factor Rating 80). On the basis of interviewee reports, this former FTA is greatly suspected of being a source of contamination.

Site No. 4: Indirect evidence (Factor Rating 80). On the basis of interviewee reports, this area is greatly suspected of being a source of contamination.

Site No. 5: Indirect evidence (Factor Rating 80). On the basis of interviewee reports, this area is greatly suspected of being a source of contamination.

Site No. 6: Indirect evidence (Factor Rating 80). Vegetation stress and oil-stained soil was observed at this site. No other source of contamination adjacent to Site No. 6.

Site No. 7: Indirect evidence (Factor Rating 80). On the basis of interviewee reports and direct observation of oil-stained soil, this site is greatly suspected of being a source of contamination.

Site No. 8: Indirect evidence (Factor Rating 80). On the basis of interviewee reports, this site is greatly suspected of being a source of contamination.

B.1 Potential for Surface Water Contamination

- Distance to Nearest Surface Water: Factor Rating 3 for Site Nos. 1, 3, 4, 5, 6, 7, and 8. These sites are closer than 500 feet from any surface water (e.g., stream, storm sewer, or drainage). Site No. 2 was given a Factor Rating of 2. It lies between 500 and 2,000 feet away from any surface water route.

- Net Precipitation: Factor Rating 1. The annual net precipitation (total precipitation minus evaporation), based on the period of 1951 to 1980, is 3.23 inches.

- Surface Erosion: Factor Rating 1. With surface topographic slope at the Base ranging from 0 to 2%, there is a slight risk of soil removal by surface erosion.

- <u>Surface Permeability</u>: Factor Rating 1. Surface soils consist of a mixture of silty clays and loams. The permeabilities of these soils range from 4.45 X 10^{-4} to 1.41 X 10^{-3} cm/sec.

- <u>Rainfall Intensity Based on 1-Year, 24-Hour Rainfall</u>: Factor Rating 3. According to available weather records (1951 - 1980), the maximum rainfall intensity (1-year, 24-hour rainfall) at the Base is 5.06 inches.

B.2 Potential for Flooding: Factor Rating 0. The Base lies beyond the 100 year flood plains of the Mohican River and its tributaries.

B.3 Potential for Groundwater Contamination

- <u>Depth to Groundwater</u>: Factor Rating 3. The shallow water table level fluctuates seasonally from 1.5 to 2.5 feet below ground surface.

- <u>Net Precipitation</u>: Factor Rating 1. See B.1.

- <u>Soil Permeability</u>: Factor Rating 2. The soil underlying the Base consists of a mixture of silty clays and loams, The permeabilities of these soils range from 4.45 X 10^{-3} cm/sec to 1.41 X 10^{-3} cm/sec.

- <u>Surface Flows</u>: Site Nos. 1, 2, 3, 5, 6, 7, and 8 have a Factor Rating of 1 because the bottoms of these sites are occasionally submerged. A Factor Rating of 2 was assessed for Site No. 4 because the bottoms of the USTs in the POL facility are frequently submerged.

- <u>Direct Access to Groundwater</u>: Factor Rating 1. Given the geological characteristics of the Base area, there is a low risk of direct contaminant access to groundwater.

IV. Waste Management Practices

A. Site No. 1, 2, 3, 4, 5, 6, 7, and 8 have no form of contaminant containment.

Appendix E

Underground Tanks

Table E.1

Underground Storage Tanks

Tank Symbol	Tank I.D. No.	Year Installed	Capacity (gallons)	Tank Contents	Tank Construction	Status
a	12004 304	1951	1,000	MOGAS	steel	active
b	12006 304	1971	3,000	Diesel	steel	active
c	12005 204-1	1950	25,000	JP-4	steel[1]	active
d	12005 204-2	1950	25,000	JP-4	steel[1]	active
e	12005 204-3	1950	25,000	JP-4	steel[1]	active
f	12005 204-4	1951	25,000	JP-4	steel[1]	active
g	83101 304-2	1973	2,000	waste oil	steel	active

NOTES:

* The approximate locations of these tanks are shown on Figure E.1.
* All steel tanks have bitumen (asphaltic) exterior coatings and sacrificial anodes for cathodic protection.
* Container I.D. No. gives tank's location (i.e., 12004 304 indicates tank is located at Building No. 304).

[1] This tank has an epoxy coating on the interior surface.

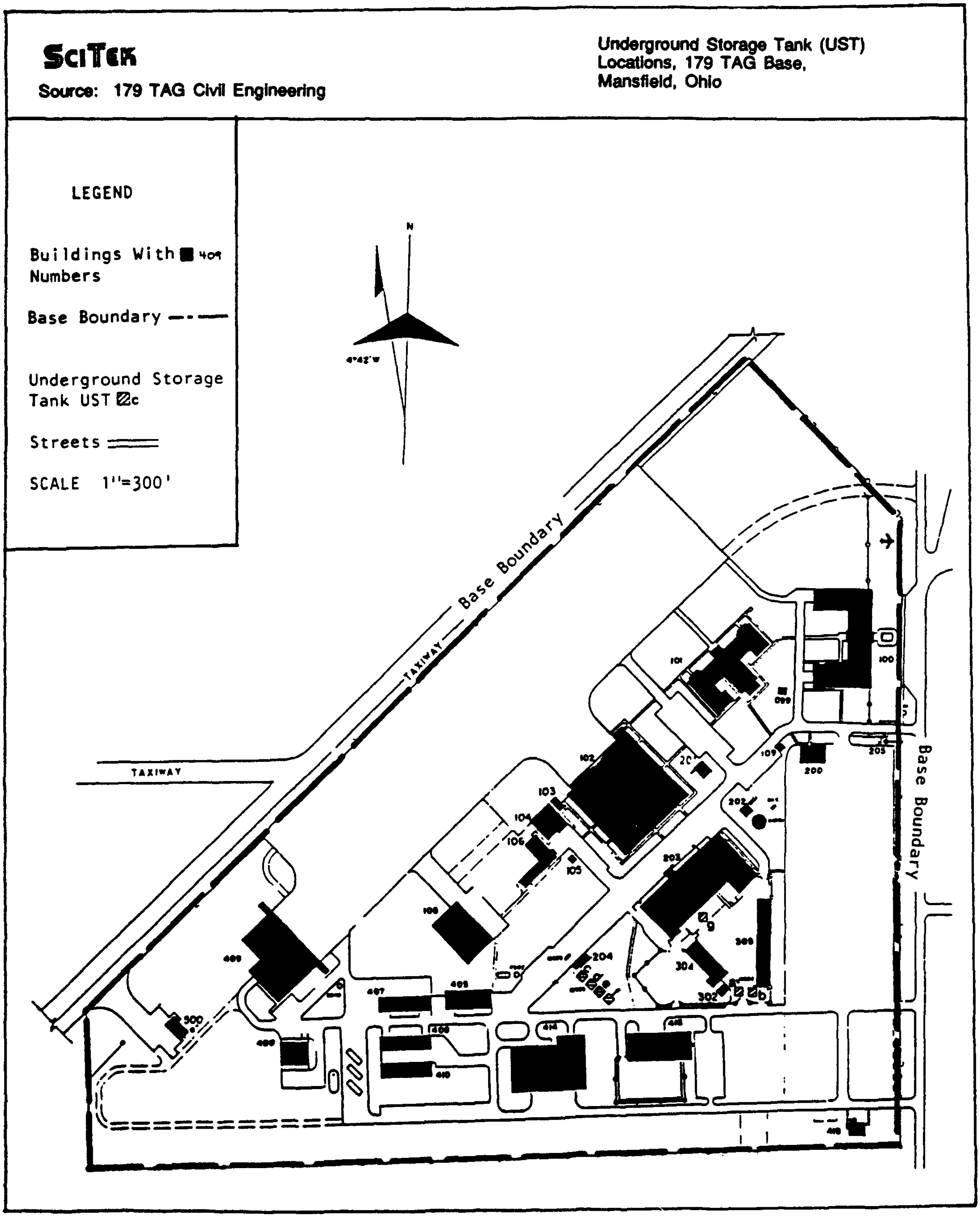

SciTek
Source: 179 TAG Civil Engineering
Underground Storage Tank (UST)
Locations, 179 TAG Base,
Mansfield, Ohio
LEGEND
Buildings With Numbers
Base Boundary
Underground Storage Tank UST
Streets
SCALE 1''=300'
N
Base Boundary
TAXIWAY
TAXIWAY
Base Boundary
100
101
102
103
104
105
106
109
200
202
203
204
205
300
302
304
407
408
409
410
414
416
418

Figure E.1.

Table E.2

Underground Heating Fuel Tanks and Oil/Water Separators

Tank Symbol	Tank I.D. No.	Year Installed	Capacity (gallons)	Tank Contents	Tank Construction	Status
a	12001 100	1978	12,000	fuel oil	steel	active
b	12001 101	1979	5,000	fuel oil	steel	active
c	12001 200	1976	1,000	fuel oil	steel	active
d	12001 201-1	1950	10,000	fuel oil	steel	active
e	12001 201-2	1978	12,000	fuel oil	steel	active
f	12001 409	1977	12,000	fuel oil	steel	active
g	12001 414	1975	8,000	fuel oil	steel	active
h	12001 416	1979	5,000	fuel oil	steel	active
i	83101 108-1	1974	300	2	concrete	active
j	83101 108-2	1974	550	3	steel	active
k	83101 304-1	1973	1,300	2	concrete	active
l	83101 409-1	1977	2,000	4	concrete	active
m	83101 409-2	1977	500	2	steel[1]	active
n	83101 409-3	1977	4,000	3	steel	active
o	83101 414	1975	500	2	concrete	active
p	83101 416-1	1979	50	2	fiberglass	active
q	83101 416-2	1979	120	3	steel	active
r	83101 500-1	1972	470	2	concrete	active
s	83101 500-2	1972	550	3	steel	active

NOTES:

- The approximate locations of these tanks are shown on Figure E.2.
- Container I.D. No. gives tank's locations (i.e., 12001 100 indicates tank is at Building No. 100).
- All steel tanks have bitumen (asphaltic) exterior coatings and sacrificial anodes for cathodic protection unless otherwise noted.

[1] This container has no cathodic protection. It is actually an oil interceptor set in a steel-reinforced concrete vault.

[2] Oil/water separator containing water and possibly petroleum products.

[3] Holding tank associated with an oil/water separator. Contains water and other petroleum products.

[4] Settling tank containing water and soil/sand particles.

SciTek

Source: 179 TAG Civil Engineering

Underground Heating Fuel Tank and Oil/Water Separator Locations, 179 TAG Base, Mansfield, Ohio

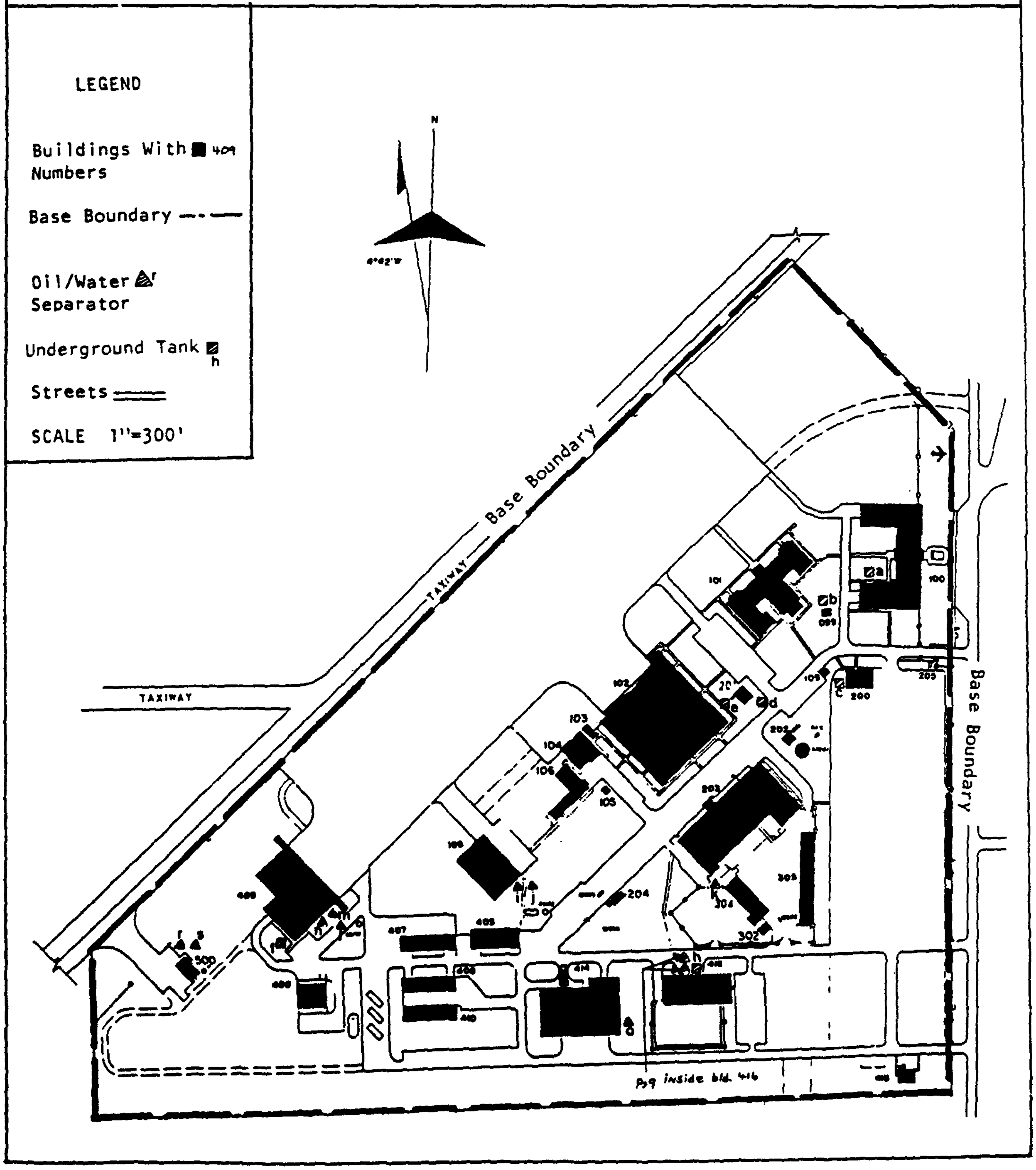


Figure E.2.

Table E.3

Miscellaneous Underground Facilities

Tank Symbol	Tank I.D. No.	Year Installed	Capacity (gallons)	Tank Contents	Tank Construction	Status
a	83102 1	1950	2,100	1	concrete	active
b	83102 2	1977	1,000	1	fiberglass	active
c	83103 104	1977	450	2	concrete	active
d	83103 414	1975	52	3	fiberglass	active
e	83103 405	1950	10,000	4	concrete	inactive
f	83103 409	1977	4,000	soap 5	steel	active
g	87141 500	1972	224	6	concrete	active

NOTES:

- The approximate locations of these items are shown on Figure E.3.
- All steel items have bitumen (asphaltic) exterior coatings and sacrificial anodes for cathodic protection.
- Container I.D. No. gives item's location (i.e., 83103 104 indicates item is located at Building No. 104).

[1] Items No. 83102-1 and 83102-2 are sanitary sewage lift stations.

[2] Item 83103 104 is a sediment interceptor.

[3] Item 83103 414 is an acid neutralizing pit.

[4] Item 83103 405 is an abandoned septic tank.

[5] Item 409 is a bulk storage tank for aircraft soap.

[6] Item 87141 500 is a storm water lift station.

SciTek

Source: 179 TAG Civil Engineering

Miscellaneous Underground Tanks,
179 TAG Base, Mansfield, Ohio

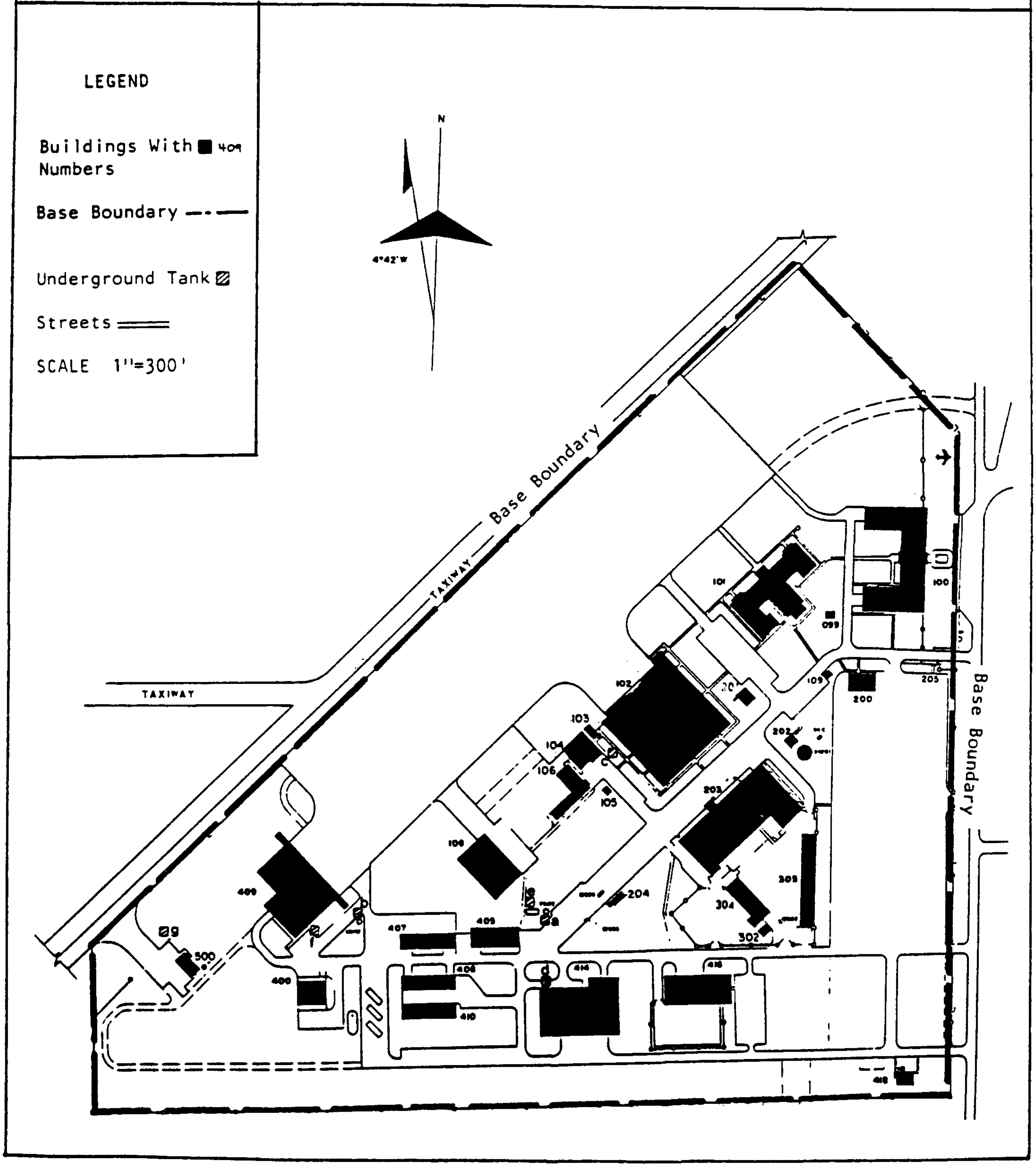


Figure E.3.

Appendix F

Polychlorinated Biphenyls (PCBs)

Testing

Polychlorinated Biphenyls (PCBs)

Fluid samples were taken from 26 transformers in 1982, and analyses were performed to determine PCB concentrations. These analyses were done by an independent contractor specializing in the testing and maintenance of power distribution systems. No PCB transformers[1] were found. Of the 26 transformers tested, only four exceeded the detection limit. Of these four, three were PCB-contaminated[2] witn concentrations ranging from 66 ppm to 81 ppm. The other was non-PCB, containing only 7 ppm. Two of these transformers are located at Building 108. The third transformer, a spare electrical device, is currently not in use. Please refer to the PCB data shown on the following pages.

[1] PCB transformers are those containing PCB concentrations of 500 ppm or greater.

[2] PCB-contaminated transformers are those containing between 50 ppm and 500 ppm PCBs.

HIGH VOLTAGE MAINTENANCE
7200 INDUSTRIAL PARK BLVD • PO BOX 316 MENTOR OHIO 44060

BUFFALO
716 693-6000

CINCINNATI
606 342-7710

CLEVELAND
216 951-2706

DAYTON
513 278-0811

INDIANAPOLIS
317 356-6411

MILWAUKEE
414 784-3660

ST. LOUIS
314 647-2777

August 2, 1982

Ohio Air National Guard
Base Civil Engineering
Mansfield Lahm Airport
Mansfield, OH 44901

ATTENTION: CAPTAIN GREG MOONEY

RE: HVM Project C-2515
Purchase Order 82097
Chromatographic Analysis

The following liquid samples have been analyzed by a gas chromatograph utilizing an electron capture detector and found to contain the indicated type and amount of PCB contamination.

Accuracy: Plus or Minus 10%
Detection Limit: 2 PPM

Location	Sample	HVM Reference No.	Aroclor Type	PPM
A	F4481004	T-660	None Detected	
A	F4481001	T-664	None Detected	
A	F4481005	T-667	None Detected	
B	78C670069	T-677	None Detected	
C	772D864001	T-672	None Detected	
D	G287143-65Y	T-663	None Detected	
D	G287128-65Y	T-673	None Detected	
D	G287127-65Y	T-683	None Detected	
E	64AE9500	T-666	None Detected	
E	M4993	T-679	None Detected	
E	64AE10081	T-670	None Detected	
E	M4996	T-678	None Detected	

August 2, 1982

Page 2

Location	Sample	HVM Reference No.	Aroclor Type	PPM
E	M4996	T-678	None Detected	
E	64AE6519	T-674	None Detected	
E	M5129	T-676	None Detected	
F	J197014Y69A	T-685	None Detected	
F	J166893Y69A	T-680	None Detected	
F	J197013Y69A	T-661	None Detected	
G	796006751	T-681	None Detected	
H	76ZD79B001	T-671	None Detected	
I	9280425	T-684	1260	7
I	9268840	T-662	1260	68
I	9268843	T-665	1260	66
J	77A212704	T-675	None Detected	
K	77L604299	T-668	None Detected	
L	K858889T72AA	T-682	None Detected	
M	57G8116	T-669	1260	81

Gerald E. Bydash

Gerald E. Bydash
Division Manager

GEB:ldm

Enclosures: Identification Cards

HIGH VOLTAGE MAINTENANCE CORP.

CLEVELAND • DAYTON • INDIANAPOLIS

HVM No. 20

TRANSFORMER LIQUID TEST REPORT

CUSTOMER OHIO AIR NATIONAL GUARD CITY MANSFIELD STATE OHIO

SUBSTATION NAME/
LOCATION I GROUND [x] ROOF [ ] POLE [ ]

OWNER IDENTIFICATION #1 Building 108 INDOOR [ ] OUTDOOR [x]

NAMEPLATE INFORMATION

(OIL) x

Manufacturer GENERAL ELECTRIC Primary Volts 7200/12470 GALLONS (ASK)

Serial No. 9280425 Sec. Volts 120/240 IMP. 2.7 @ 75°C

KVA 50 Phase/Hertz 1 / 60 Type & Class H5

Bushings (Top) (Side)

Connections OK Liquid Temp. NA T.C. Pos. & Type 4

Fans & Controls NONE Max. Temp. NA Top Valve Size NA

Grounds OK Liquid Level LOW Bottom Valve Size 1/2

P/V NA Other Access NA

LEAKS NONE

Inspected & Tested By: J.O. 7 PPM PCB CONTAMINATION

		220 440 Power	De-energized Energized	Comments	
DATE	**DIELECTRIC**	**ACID No.**	**I.F.T.**	**COLOR**	**CLASS**
7-19-82	26	0.05	17.6	1.5	BAD
	SPECIFIC GRAVITY:	0.880 @ 75°F			

HIGH VOLTAGE MAINTENANCE CORP.

CLEVELAND • DAYTON • INDIANAPOLIS

HVM No. 22

TRANSFORMER LIQUID TEST REPORT

CUSTOMER OHIO AIR NATIONAL GUARD **CITY** MANSFIELD **STATE** OHIO

SUBSTATION NAME/ LOCATION I **GROUND** [X] **ROOF** [ ] **POLE** [ ]

OWNER IDENTIFICATION #3 Building 108 **INDOOR** [ ] **OUTDOOR** [X]

NAMEPLATE INFORMATION

				(OIL)	X
Manufacturer	GENERAL ELECTRIC	Primary Volts	7200/12470	GALLONS (ASK)	
Serial No.	9268843	Sec. Volts	120/240	IMP.	2.7 @ 75°C
KVA	50	Phase Hertz	1 / 60	Type & Class	HS

Bushings	(Top) (Side)	Liquid Temp.	NA	T.C. Pos. & Type	4
Connections	OK	Max. Temp.	NA	Top Valve Size	NA
Fans & Controls	NA	Liquid Level	LOW	Bottom Valve Size	1/2
Grounds	OK	P/V	NA	Other Access	NA

LEAKS NONE

Inspected & Tested By: J.O.

66 PPM PCB CONTAMINATION

DATE	DIELECTRIC	220 / 440 Power ACID No.	De-energized / Energized I.F.T.	Comments COLOR	CLASS
7-19-82	31	0.11	17.7	1.5	BAD
	SPECIFIC GRAVITY:	0.880 @ 75 °F			

HIGH VOLTAGE MAINTENANCE CORP.

CLEVELAND • DAYTON • INDIANAPOLIS

HVM No. 21

TRANSFORMER LIQUID TEST REPORT

CUSTOMER: OHIO AIR NATIONAL GUARD   CITY: MANSFIELD   STATE: OHIO

SUBSTATION NAME/
LOCATION: I   GROUND [X]   ROOF [ ]   POLE [ ]

OWNER IDENTIFICATION: #2 Building 108   INDOOR [ ]   OUTDOOR [X]

NAMEPLATE INFORMATION

Manufacturer: GENERAL ELECTRIC   Primary Volts: 2700/12470   (OIL) x   GALLONS (ASK)

Serial No.: 9268840   Sec. Volts: 120/240   IMP.: 2.7 @ 75°C

KVA: 50   Phase/Hertz: 1 /60   Type & Class: HS

Bushings (Top) (Side)
Connections: OK   Liquid Temp.: NA   T.C. Pos. & Type: 4

Max. Temp.: NA   Top Valve Size: NA

Fans & Controls: NA   Liquid Level: LOW   Bottom Valve Size: 1/2

Grounds: OK   P/V: NA   Other Access: NA

LEAKS: NONE

Inspected & Tested By: J.O.   68 PPM PCB CONTAMINATION

		220 / 440 Power	De-energized / Energized	Comments	
DATE	DIELECTRIC	ACID No.	I.F.T.	COLOR	CLASS
7-19-82	28	0.05	25.6	1.5	GOOD
	SPECIFIC GRAVITY: 0.880 @ 75°F				

HIGH VOLTAGE MAINTENAN[illegible] CORP.

CLEVELAND • DAYTON • INDIANAP[illegible]IS

HVM No. 26

TRANSFORMER LIQUID TEST REPORT

CUSTOMER OHIO AIR NATIONAL GUARD CITY MANSFIELD STA[illegible] OHIO

SUBSTATION NAME/
LOCATION M GROUND ☐ ROOF ☐ POLE [illegible]

OWNER IDENTIFICATION Spare INDOOR ☐ OUT[illegible]OR ☒

SPARE POLE MOUNT

NAMEPLATE INFORMATION

(OIL) X

Manufacturer WESTINGHOUSE Primary Volts 7200/12470 GALL[illegible]S (ASK)

Serial No. 57G8116 Sec. Volts 120/240 IMP. 2.3

KVA 10 Phase/Hertz 1/60 Type [illegible] Class OA

Bushings (Top) (Side) Liquid Temp. NA T.C. Pos. & Type 1

Connections OK Max. Temp. NA Top Valve Size NA

Fans & Controls NA Liquid Level OK Bottom Valve Size NA

Grounds NA P/V NA Other Access TOP HATCH

LEAKS NONE

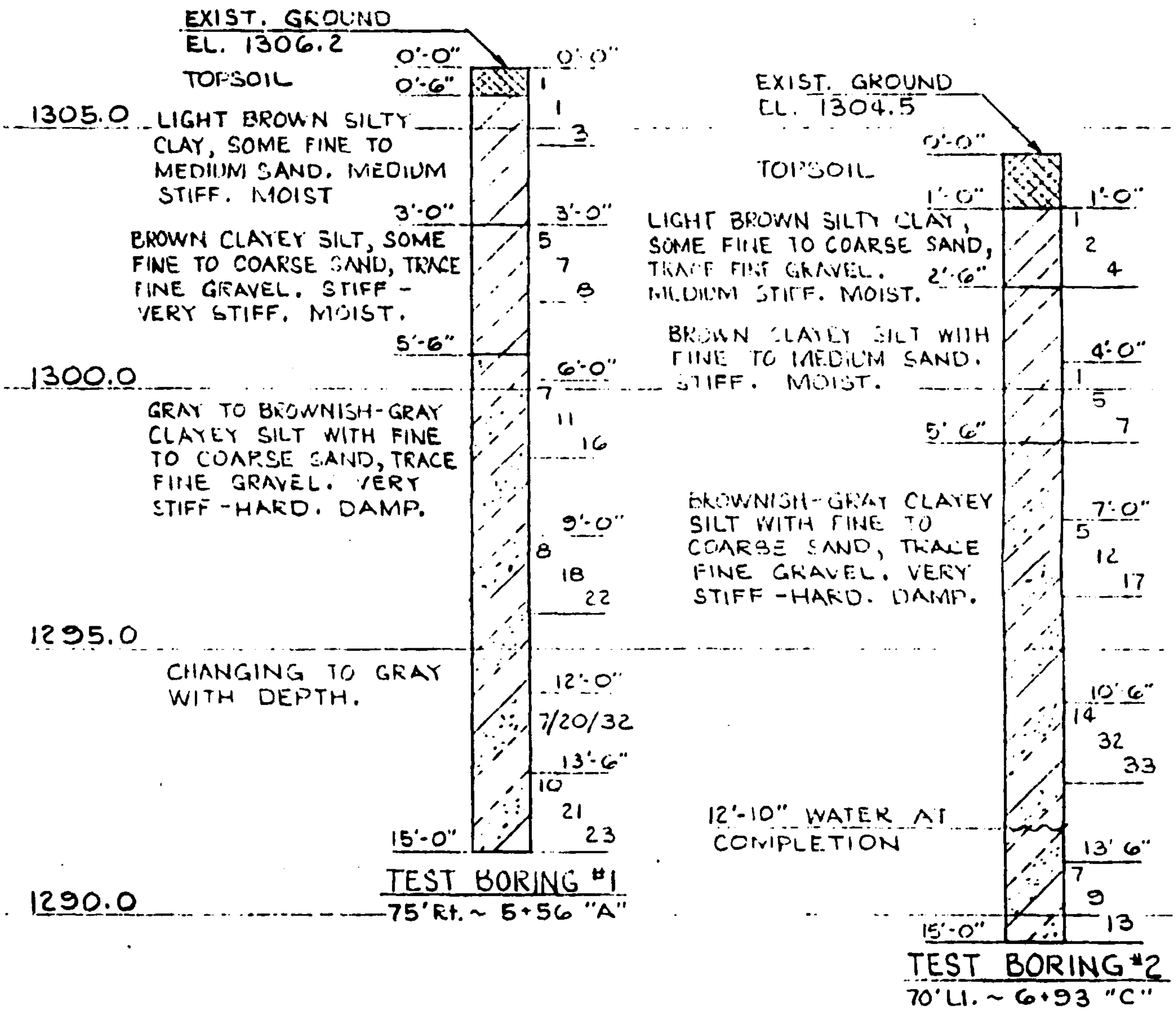
Inspected & Tested By: Joe

81 PPM PCB CONTAMINATION

DATE	DIELECTRIC	220 440 Power ACID No.	De-energized Energized I.F.T.	Comments COLOR	CLASS
7-19-82	23	0.05	17.6	1.5	BAD
	SPECIFIC GRAVITY:	0.880 @ 75 ^{O}F			

Appendix G

Soil Borings


EXIST. GROUND
EL. 1306.2
TOPSOIL
0'-0"
0'-6"
1305.0
LIGHT BROWN SILTY CLAY, SOME FINE TO MEDIUM SAND. MEDIUM STIFF. MOIST
3'-0"
BROWN CLAYEY SILT, SOME FINE TO COARSE SAND, TRACE FINE GRAVEL. STIFF - VERY STIFF. MOIST.
5'-6"
1300.0
GRAY TO BROWNISH-GRAY CLAYEY SILT WITH FINE TO COARSE SAND, TRACE FINE GRAVEL. VERY STIFF-HARD. DAMP.
1295.0
CHANGING TO GRAY WITH DEPTH.
15'-0"
1290.0
0'-0"
1
1
3
3'-0"
5
7
8
6'-0"
7
11
16
9'-0"
8
18
22
12'-0"
7/20/32
13'-6"
10
21
23
TEST BORING #1
75' Rt. ~ 5+56 "A"
EXIST. GROUND
EL. 1304.5
0'-0"
TOPSOIL
1'-0"
LIGHT BROWN SILTY CLAY, SOME FINE TO COARSE SAND, TRACE FINE GRAVEL. MEDIUM STIFF. MOIST.
2'-6"
BROWN CLAYEY SILT WITH FINE TO MEDIUM SAND. STIFF. MOIST.
5'-6"
BROWNISH-GRAY CLAYEY SILT WITH FINE TO COARSE SAND, TRACE FINE GRAVEL. VERY STIFF-HARD. DAMP.
12'-10" WATER AT COMPLETION
15'-0"
1'-0"
1
2
4
4'-0"
1
5
7
7'-0"
5
12
17
10'-6"
14
32
33
13'-6"
7
9
13
TEST BORING #2
70' Lt. ~ 6+93 "C"

TEST BORING # ONE

ELEVATION	DESCRIPTION		DEPTH IN FEET		STANDARD PENETRATION (N)	RECOVERY IN INCHES	SAMPLE NO., DRIVE
1306.5							
	TOPSOIL		0.8'		8, 11, 5	13	1
1305	DAMP — CLAYEY SANDY SILT TO SANDY CLAYEY SILT, WITH SANDSTONE FRAGMENTS, TRACE ROOT FIBERS	GRAY AND BROWN WITH RUST STAINS	2.8'		9, 9, 46	18	2
	MOIST — SANDY CLAYEY SILT WITH SANDSTONE FRAGMENTS				50	# 5	3
	SANDY SILTY CLAY TO CLAYEY SANDY SILT, WITH LITTLE GRAVEL SIZES, LIMESTONE AND SANDSTONE FRAGMENTS		6.2'		8, 12, 15	17	4
1300	MOIST — SANDY SILTY CLAY WITH TRACE GRAVEL SIZES	BROWN			21, 24, 28	18	5
		BROWN TRACE OF GRAY			14, 18, 21	17	6
					16, 22, 26	18	7
1295	WATER SEEPAGE @ 12.3'				12, 20, 25	18	8
	MOIST TO WET — SAND SEAM, 12.3' TO 12.9'		13.7'		14, 16, 20	17	9
1291.5	MOIST — SANDY SILTY CLAY WITH TRACE GRAVEL	BROWN, BROWNISH GRAY	15.0'		10, 13, 16	14	10

TEST BORING # TWO

Elevation	Moisture	Description	Color	Depth	Blows	Recovery	Sample
1307.7	WET	TOPSOIL		0.5'	14 9 10	8	1
	MOIST	SANDY CLAYEY SILT TO CLAYEY SANDY SILT - ROOT FIBERS	BROWN		4 6 7	8	2
1305		SANDY CLAYEY SILT TO SILTY CLAY - TRACE ROOT FIBERS	GRAY AND DUSTY BROWN	4.7'	8 11 18	18	3
	DAMP	SANDY SILTY CLAY WITH TRACE GRAVEL	BROWN		6 10 14	18	4
1300					14 22 30	17	5
		SAND SEAM 8.1' TO 9.2'			14 16 18	18	6
	MOIST	SANDY CLAY-SILT TO SILT-CLAY	BROWN WITH TRACE GRAY		10 17 23	18	7
	DAMP	SANDY SILTY CLAY WITH TRACE GRAVEL	BROWN				
		SHALE FRAGMENTS 9.2' TO 12.0'	GRAY		23 24 25	18	8
1295					17 23 26	18	9
1292.7	DAMP TO MOIST	LIMESTONE FRAGMENTS 13.5' TO 15.0'	BROWN TO BROWNISH GRAY		9 16 22	18	10